MacWEEK

05.17.93 Volume 7 Number 20 THE NEWSWEEKLY FOR MACINTOSH MANAGERS

68040 accelerators
DayStar Turbo 040, Fusion TokaMac 33c bring older Macs to Quadra level

La Cie Silverscanner II
New scanner engine a big improvement

Map-making software
A comparison of Geocart and Azimuth

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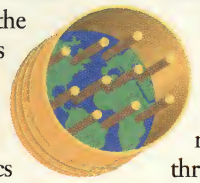
In Reviews

High-performance Apple port to take Mac connectivity by storm

By Robert Hess

Cupertino, Calif. — Apple will bring a new world of connectivity possibilities to the Mac with a high-performance digital communications port to be introduced this summer.

Dubbed GeoPort, the technology will be included in the Cyclone and Tempest Macs due this summer, as well as in PowerPC-based Macs next year. Products in Apple's personal-electronics line, such as Newton, will also eventually use GeoPort technology.



GeoPort consists of several hardware and software components: a new physical connection, an application programming interface (API) and other software that takes advantage of digital signal processing (DSP) chips, hardware and third-party external interface boxes that connect to a GeoPort and expand its connectivity.

While current Mac serial ports serve one function at a time, the GeoPort supports such high throughput that, when it is combined with the multiplexing technology, it can maintain multiple connections.

Theoretically, users could simultaneously print to a high-speed serial printer, download data from an on-line service at 14.4 Kbps and maintain a high-bandwidth network connection — all through a single GeoPort.

Sources said Apple believes a GeoPort can deliver as much as 2 Mbits per second throughput, about 10 times faster than current LocalTalk ports.

Apple is most excited about GeoPort's telephony possibilities, according to sources.

The company is encouraging the development of external interface boxes that can be hooked up to GeoPort to inexpensively connect the Macintosh to ISDN (Integrated

See GeoPort, Page 128

Amber: Apple's answer to OLE

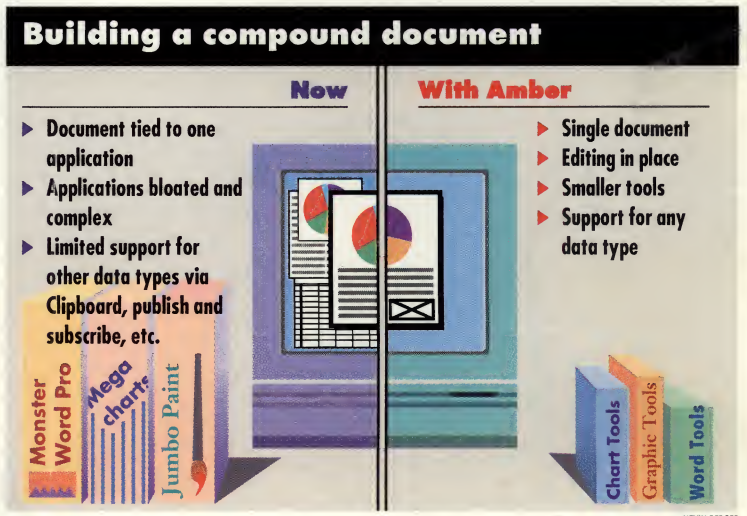
Open doc architecture unveiled at WWDC

By Raines Cohen and Henry Norr

San Jose, Calif. — Apple last week unveiled a new cross-platform open-document architecture intended to redefine the relationship between documents, applications and users — and, not incidentally, to offer application developers an alternative to a comparable specification from Microsoft Corp.

The Apple-developed technology, called Amber, is designed to bring about a gradual shift from the application-centered approach that characterizes desktop computing toward a more document-centered approach.

Announcing the technology at its Worldwide Developers Conference here last week, Apple said it will make the Amber specification and source code available without restriction and work with other vendors to bring the architecture to Windows and Unix.



NEVIN BERGER

Mac and Windows implementations will be available within a year, with the Unix code to follow, according to company officials.

Documents created by future Amber-compatible applications will be capable of storing and displaying any kind of data, and users will be able to edit any data type directly from within such documents; provided that an application capable of editing the data is available in the user's environment, double-clicking on the data will cause that application's menus to take over the tool bar; clicking on another type of data will in turn bring up a different set of menus and tools.

See Amber, Page 127

Special Report

WIDE-AREA NETWORKS

MacWEEK examines high-bandwidth technologies

See Page 29

Mac apps to find new home on Unix turf

Current software will run on workstations

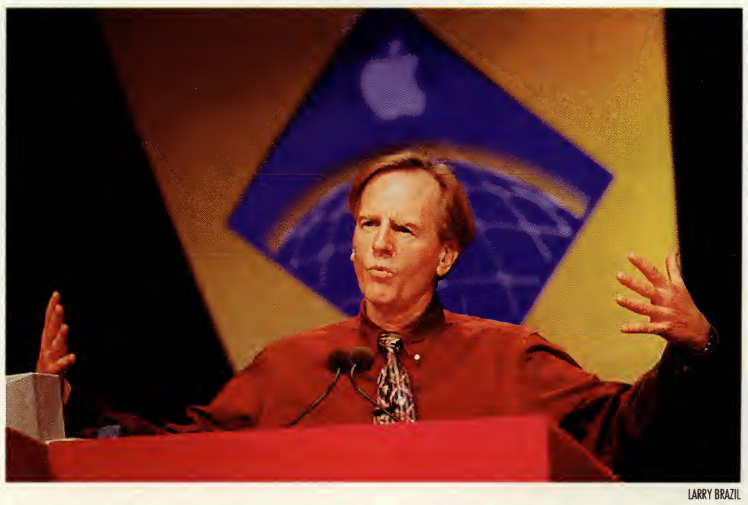
By Henry Norr and April Streeter

San Jose, Calif. — Apple last week announced plans to bring the long-proprietary look and feel of the Mac to users of high-powered Unix workstations from Sun Microsystems Inc., Hewlett-Packard Co., IBM Corp. and possibly other open-systems vendors.

With representatives of the workstation vendors on hand to endorse the move, Apple announced at its Worldwide Developers Conference here that its Enterprise Systems Division will provide a set of software modules, tentatively called Apple Services for Open Systems, that will enable existing Macintosh applications to run without modification in an X Window on the Unix systems.

Eventually, Apple said, it will also offer native versions of the Mac Toolbox and application programming interfaces for such Unix variants as AIX, Solaris, HP-UX and Unix Systems Laboratories Inc.'s Unixware.

See Open Systems, Page 127



LARRY BRAZIL

CEO John Sculley addressed developers at the Apple Worldwide Developers Conference, where Apple outlined its strategy to bring Mac software to a number of Unix platforms.

Apple unlatches object-oriented Newton Toolkit

By Carolyn Said

San Jose, Calif. — Apple went to town last week to urge developers to write applications for its forthcoming family of Newton products.

At the Apple Worldwide Developers Conference here, the company's Personal Interactive Electronics Division rolled out the Newton Toolkit, a Mac-based set of developer tools for its personal digital assistants. Developers said they were impressed by the tools but remained cautious about the market possibilities.

NewtonScript, an object-oriented dynamic language, is at the heart of Newton programming.

"NewtonScript is vastly superior to HyperCard," said Scott Wiener, CEO of Common Knowledge Inc. in Palo Alto, Calif. "It's a real language, with real objects under it." Wiener added: "All the capabilities of the platform are open to developers. There's no secret behavior that

See Newton, Page 128

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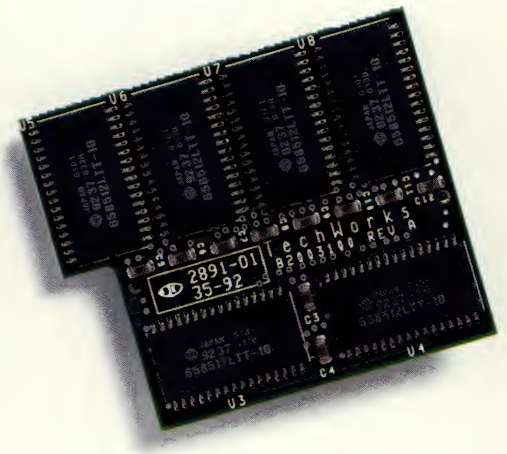

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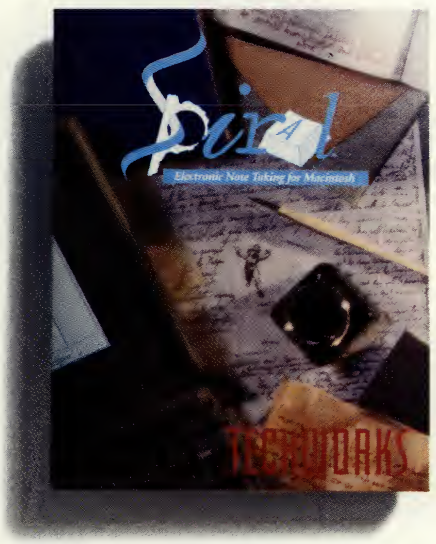

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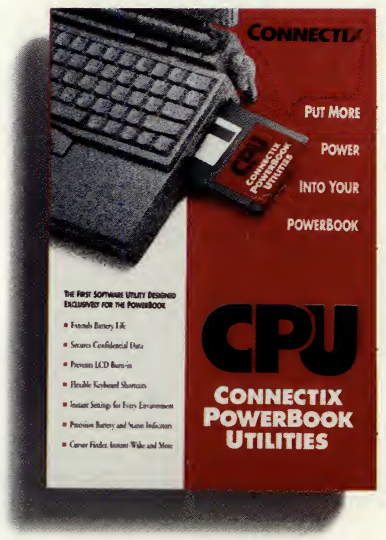

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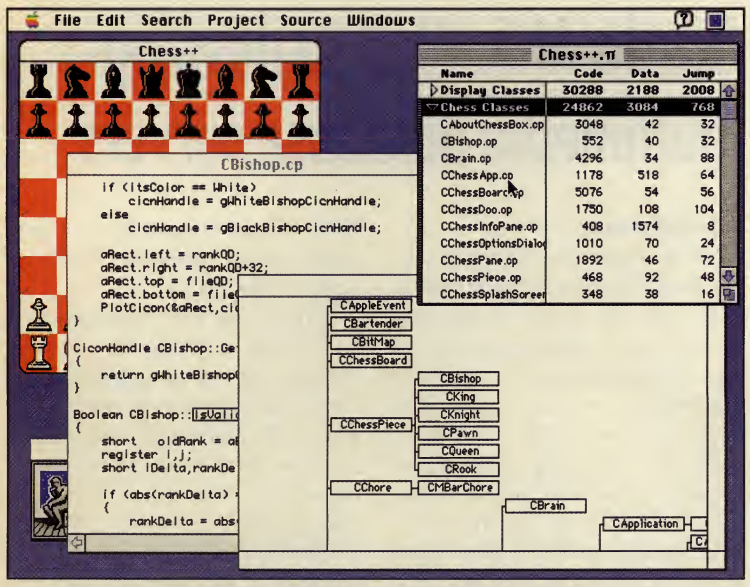

Symantec C++ for Macintosh brings a native compiler for the object-oriented language. Shown here is a sample application called Chess++.

Apple turns to Symantec for new development tools

By Henry Norr

San Jose, Calif. — Apple may be setting the direction, but increasingly, it will be Symantec Corp. providing the tools that take Mac developers to new platforms.

As Symantec last week shipped new C++ and C compilers for the Mac and offered developers their first detailed glimpse at the Bedrock cross-platform application framework, Apple announced that it is turning to its Cupertino, Calif.-based neighbor to create a new development environment to succeed the Macintosh Programmer's Workshop.

Designed to run on PowerPC-based Macs, the new product will incorporate features and technologies from MPW but will be derived primarily from Symantec's Think series, officials said. Unlike Symantec's current Think products, however, the environment will have an open architecture, allowing developers to plug in compilers for other languages and their favorite third-party tools.

The product will be owned by Symantec but marketed by both companies. Apple and Symantec said they hope to release it soon after Apple delivers its first PowerPC-based Macs early next year. Name and pricing have not been set. Apple said it will continue to support MPW but won't make additional major investments in it.

The new environment, accompanied by PowerPC C++ and C compilers, is intended to simplify the development of native-mode applications for the new RISC Macs. Mac developers have to turn to an RS/6000 workstation from IBM Corp. to compile code for the RISC Macs.

Plans for the new environment were announced at the Apple Worldwide Developers Conference here, where Symantec also distributed a free CD-ROM called the Bedrock Architecture CD. Designed to help developers become familiar with the upcoming application framework for Mac and Windows, the disc includes Bedrock header files, documentation and sample programs.

The company said it will deliver an initial version of Bedrock to developers in the fourth quarter and a second developer version in early 1994; general release will come later next year.

In the here and now, Symantec has released three new products:

- **Symantec C++ 6.0 for Macintosh** is the first Mac development environment with an integrated, native C++ compiler, which company officials described as "the fastest C++ compiler in the universe."

Positioned as the successor to Think C 6.0, the package also includes an improved C compiler; new versions of the Think browser, incremental linker and Project Manager; and Apple's SourceServer, a code-control system intended to facilitate team programming. The package lists for $499; upgrades for Think C 5.0 users are $149.95.

- **Think C 6.0,** priced at $299, does not include C++ but offers the other enhancements of Symantec C++ 6.0. Upgrades are $89.95.
- **Symantec C++ for MPW,** priced at $499, offers MPW users a native C++ compiler that works, according to the company, 50 percent faster than Apple's current C++ preprocessor for MPW.

Symantec Corp. is at 10201 Torre Ave., Cupertino, Calif. 95014. Phone (408) 253-9600; fax (408) 253-4092. □

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MacProject Pro learns to share

Version 1.5 reads Microsoft MPX files

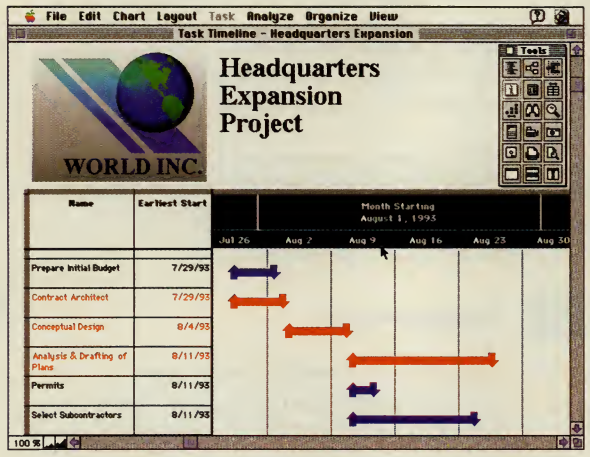
By Lisa Picarille

Santa Clara, Calif. — Claris Corp. this week will ship an upgrade to MacProject Pro designed to simplify data sharing and streamline productivity for users of the project manager.

MacProject Pro 1.5 lets users exchange files with Mac and Windows versions of Microsoft Project, as well as other project-management applications that support the Microsoft Project MPX format.

The $599 program now has AppleScript support to help automate tasks such as batch printing. It comes with sample AppleScripts for batch printing and generating time lines from FileMaker Pro 2.0.

A new context-sensitive floating tools palette has 18 buttons for frequently used functions such as search, sort, print, column setup and resource leveling.



Claris' MacProject Pro 1.5 displays a project time line simultaneously in various time increments, such as day, week, month and year.

A button called Perspective lets users save different views of charts with complete settings for chart positions, sort order and zoom. Views can be named and used in reports or presentations.

"[Perspective] lets you give a view for anyone who needs a report for a specific time period," said Randolph Craft, president of Advanced Management and Planning, a project consultancy in Honolulu.

Users can now display project time lines simultaneously in varying time increments, such as day, week, month and year.

Upgrades are $29, or free to users who purchased MacProject Pro 1.0 after April 1. Users of competitive project-management packages can move to MacProject Pro 1.5 for $199.

Claris Corp. is at 5201 Patrick Henry Drive, P.O. Box 58168, Santa Clara, Calif. 95052-8168. Phone (408) 727-8227 or (800) 544-8554. □

Oracle, U.S. West to develop multimedia database servers

By April Streeter

San Francisco — Oracle Corp. last week announced it will team up with U.S. West Inc. to develop high-powered database servers to manage the plethora of multimedia information traveling along data highways to end users.

Oracle will offer versions of Oracle 7.1, slated to ship in October, and Oracle 8, due next year, that manage multiple data types stored on massively parallel computers, such as those from nCube Inc. of Beaverton, Ore. Massively parallel computers can process thousands of transactions at a lower cost per mips than mainframes.

Oracle's multimedia information servers, which will be sold to service providers such as U.S. West, will manage back-end SQL data, text, images, audio and video that hail from information providers such as Time Warner Inc. and Dow Jones & Co. Oracle said a common way to package data is the missing link in delivering services such as video on demand to users of Macs, IBM PCs or compatibles, or personal digital assistants such as Apple's Newton.

U.S. West will offer business and home users in its 14-state Western service area both broadband connections to the data highway and multimedia messaging services that access data through the servers. Prices have not been determined.

Oracle said it has not decided whether it will develop end-user clients for the new server software itself or team up with third parties. Oracle's Glue application programming interface, which is due for the Macintosh this year for $2,995, will let developers put database, messaging, file-system and communications hooks into cross-platform Oracle applications.

Oracle CEO Larry Ellison said a similar partnership with McCaw Cellular, which had been aimed at obtaining spectrum from the Federal Communications Commission for point-to-multipoint data broadcasts, was currently "not at all active." □

API to open FrameViewer to more apps

By Carolyn Said

San Jose, Calif. — Frame Technology Corp. is extending the scope of its FrameViewer cross-platform electronic document distribution program.

Frame said the next version of FrameViewer will offer an application programming interface (API) to let developers integrate document viewing with other applications. FrameViewer now works only with documents created in Frame's FrameMaker publishing application.

FrameViewer, which runs on Mac, Windows and Unix platforms, lets networked users view, print, navigate and distribute electronic documents.

Frame said outside developers will be able to customize the new version's interface. For example, a developer could add or remove menu items for a particular installation. The updated FrameViewer will provide text search and retrieval through Verity Inc.'s retrieval engine, which supports Boolean and proximity searches. Adobe Systems Inc. has also licensed the Verity technology for its Acrobat document distribution scheme.

With the new FrameViewer, users will be able to annotate documents with electronic bookmarks and comments.

The new Mac and Windows versions will ship by year-end at about $90, the same price as the current version. The company said it has not set pricing for the developers kit that gives access to the FrameViewer API.

Frame Technology Corp. is at 1010 Rincon Circle, San Jose, Calif. 95131. Phone (408) 433-3311; fax (408) 433-1928. □

FTC lawyers to call for Microsoft injunction

Washington — The Federal Trade Commission has decided to take another crack at Microsoft Corp. in its ongoing antitrust investigation.

Staff lawyers in the FTC's Bureau of Competition are expected to present a new set of recommendations to the FTC commissioners next month in their latest effort to file a federal injunction against the software giant, sources said. A final vote on the new recommendations is expected within 60 days.

Industry sources said the complaint will allege that Microsoft has maintained its dominance of the personal computer industry by violating antitrust laws.

For almost three years, the FTC has been probing Microsoft's methods of licensing its MS-DOS operating system software to computer manufacturers.

FTC lawyers had strongly urged antitrust action in February, but the commission was unable to reach a decision (see MacWEEK, Feb. 15).

Microsoft declined to comment. □

No Hands delivers electronic document system

Common Ground out ahead of Acrobat

By Neil McManus

Belmont, Calif. — No Hands Software Inc. got a jump on Adobe Acrobat last week by shipping Common Ground, its electronic document distribution system.

Common Ground lets users save documents in a format that others can view, navigate, search and print without having the creating applications or fonts in their systems.

No Hands said this summer it will release a Windows version of the program that will permit cross-platform document distribution.

Common Ground for the Macintosh, available now for $189.95, includes:

- **Common Ground Maker,** a Chooser-selectable driver that prints documents to disk in Digital-Paper format from any application. The driver creates a file containing bit-mapped representations of Type 1 and TrueType fonts in four resolutions: 72 dpi for Mac screens, 100 dpi for Windows screens, 200 dpi for fax transmission and 300 dpi for laser printing. The converted file also contains ASCII text. Formatted text requires about 6 Kbytes of hard disk space per page, No Hands said.

Document layout and colors are preserved in Common Ground, and all images are converted to a proprietary cross-platform graphics format.

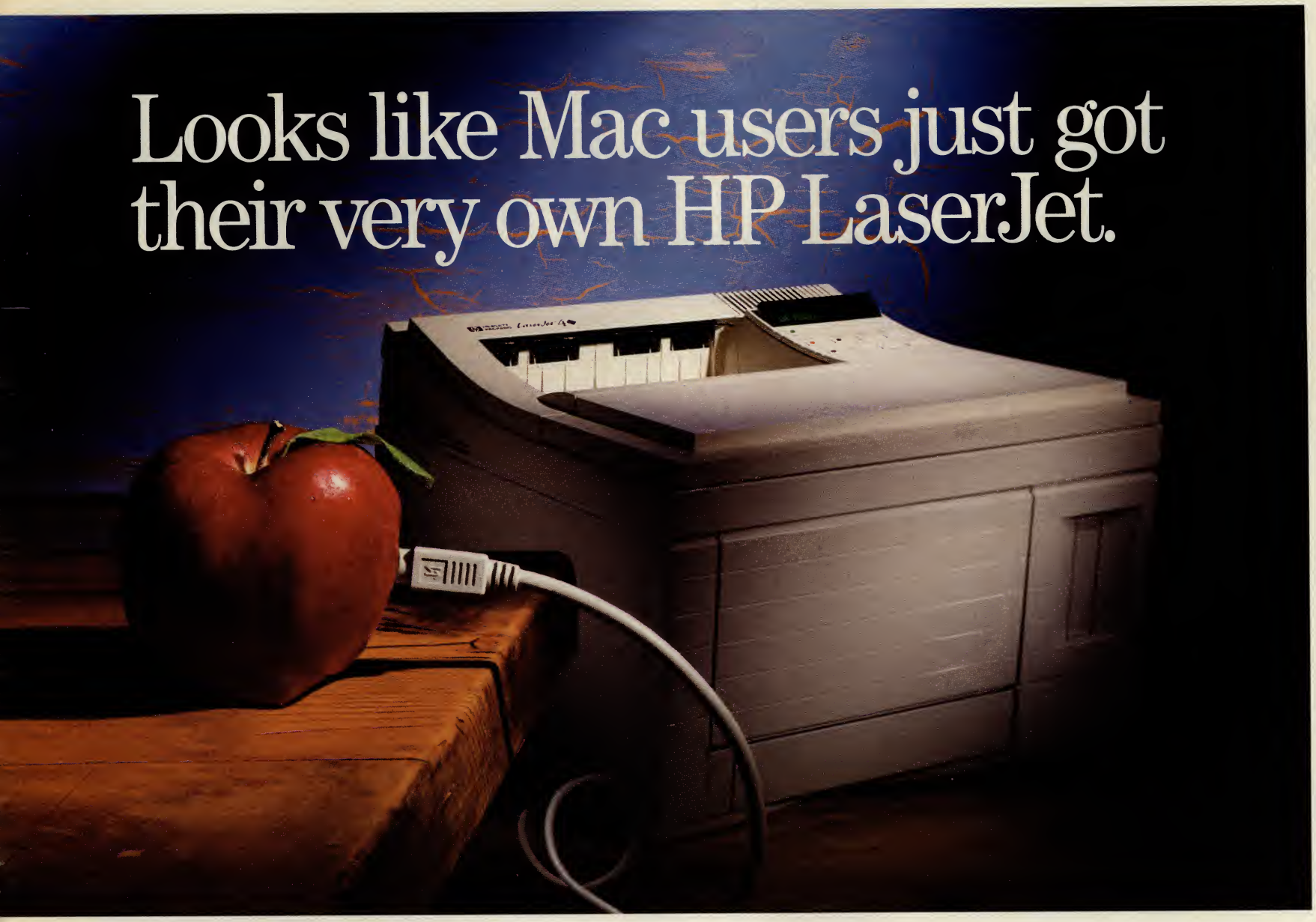
- **Common Ground Viewer,** a program that lets users read, search and print Common Ground documents. Users can zoom in on documents up to 400 percent while maintaining resolution and anti-aliasing. Text can be copied to the Clipboard, and selections or entire pages can be copied and pasted into other programs in PICT format.
- **Mini-Viewer,** a 62-Kbyte program that can be embedded into Common Ground documents to make them self-running. It lets users view and print but not search or zoom files. Mini-Viewer can be distributed to as many as 100 users without paying a licensing fee.

Common Ground will compete with Acrobat, a forthcoming cross-platform electronic document distribution system from Adobe Systems Inc. of Mountain View, Calif., as well as Frame Technology Corp.'s FrameViewer (see story, left).

No Hands Software Inc. is at 1301 Shoreway Road, Suite 220, Belmont, Calif. 94002. Phone (415) 802-5800; fax (415) 593-6868. □

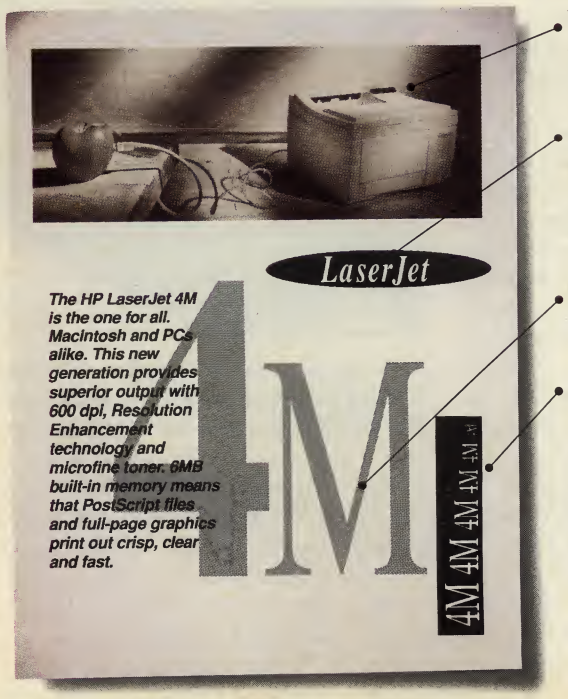
No Hands' Common Ground Viewer lets users read, zoom, search and print documents created in any Mac program. This file was created in QuarkXPress.

Looks like Mac users just got their very own HP LaserJet.



The new generation HP LaserJet 4M printer.

At last. An HP laser printer built specifically for the Mac—the new LaserJet 4M. A laser printer with everything Mac users need. From built-in PostScript™ Level 2 software from Adobe™ to standard LocalTalk and optional EtherTalk.



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The finest print quality in its class.
Thanks to HP's microfine toner, Resolution Enhancement technology, and advanced engine designed expressly for 600 x 600 dpi, the LaserJet 4M printer delivers the finest print quality of any 600-dpi machine available.

And with a new RISC processor and 6 MB of standard memory accelerating formatting and I/O speeds, complex PostScript and graphics files are rendered faster and more clearly than ever before.

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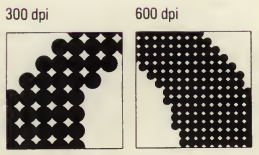
The HP LaserJet 4M printer also sets new standards in versatility, with a wide range of typefaces and two integrated paper trays.

As well as the options of a 500-sheet tray and power envelope feeder.



Four times the dots for better resolution.

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KaleidaGraph gets broader scope

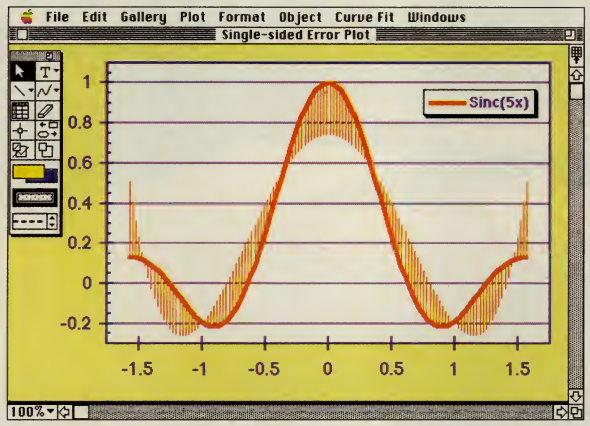
Version 3.0 improves interface, math

By Lisa Picarille

Reading. Pa. — Synergy Software this month updated its KaleidaGraph technical graphing and analysis program with a simpler interface, beefed-up mathematical functions and enhanced System 7 support.

KaleidaGraph 3.0, available now for $249, adds new drawing tools, such as copy, duplicate, group, align and layer; an editable palette that supports 64 colors, increased from eight; support for 16 user-defined curve fits on a single plot, up from one fit per plot; and 12 formats for displaying date and time data.

Users can now interrupt screen redraw when displaying multiple graphs on screen. Enhanced data-manipulation features include multilevel sorts, double-precision data format, and user-selectable error bars with independent upper and lower error types. The formula entry offers additional statistical functions.



Synergy Software's KaleidaGraph 3.0 lets users display the percentage of error both above and below the plotted line simultaneously or separately.

KaleidaGraph 3.0 can directly import Microsoft Excel and Encapsulated PostScript files. It now supports publish and subscribe, Apple events, and AppleScript.

Beta-tester Peter Rauenbuehler, a section head in quality control at Genentech Inc., a South San Francisco, Calif., biotechnology company, uses KaleidaGraph's macro language and AppleScript to write routines that automate the analysis of pharmaceutical-compound activity. "There is no data-analysis package that is more automated and takes better advantage of the Mac," he said.

Upgrades are $35 plus shipping.

Synergy Software is at 2457 Perkiomen Ave., Reading, Pa. 19606. Phone (215) 779-0522; fax (215) 370-0548. □

Aladdin launches InstallerMaker

By Robert Hess

Watsonville, Calif. — Raymond Lau, creator of the StuffIt compression utility, has returned to Mac development with StuffIt InstallerMaker, which Aladdin Systems Inc. claims represents the next generation in software installation utilities.

The current standard, Apple's Installer, requires publishers to prepare installation packages using Macintosh Programmer's Workshop, and the process is often time-consuming and difficult, according to developers.

Aladdin said developers can use StuffIt InstallerMaker's point-and-click interface to prepare installation packages in a matter of minutes instead of days. A package can be a single application incorporating all components to be installed, or an application and several disks of components.

Not surprisingly, InstallerMaker packages and the installer application it creates are precompressed using the StuffIt technology.

InstallerMaker, due next month at a price not yet set, offers developers considerable control over the at installation process, letting them require that users have specific hardware and software present to perform installation. InstallerMaker can check system versions, color capabilities, CPU models and more.

Developers can expand on InstallerMaker's capabilities through the use of external resources to detect a hardware copy-protection key, for example.

Authors can customize InstallerMaker with splash screens and help files. The program supports several custom Apple events, so MPW diehards could use that system to script InstallerMaker to prepare installation packages.

Aladdin plans to license InstallerMaker to developers on a volume basis. The company said it may later offer the program to network administrators who need to create installation packages for in-house software.

Aladdin Systems Inc. is at 165 Westridge Drive, Watsonville, Calif. 95076. Phone (408) 761-6200; fax (408) 761-6206. □

StuffIt's interface is enhanced in Aladdin's InstallerMaker, which developers can use to produce software installation packages. This screen gives developers access to almost all configuration details of an installation package.

Quorum to release its solution for running Mac apps on Unix

By Robert Hess

Menlo Park, Calif. — The tidal wave pushing Mac applications onto Unix moves forward with the release next month of two software packages from Quorum Software Systems Inc.

The products allow Mac software to be run on SPARCstations from Sun Microsystems Inc. and Indigo workstations from Silicon Graphics Inc.

▸ **Equal 1.0.** Quorum will ship a $695 package that will let Unix users run Microsoft Word and Excel Mac applications. Quorum plans to release an update to Equal late this year that it said will run the top-10 personal-productivity Mac applications.

Quorum said that Equal works at the operating system level, resulting in better performance than emulators that translate individual instructions; for example, the company said, Excel on a SPARCstation 10 is slightly faster than on a 68040 Mac.

Mac applications running under Equal adopt the interface of the host platform. All graphical components are converted to the corresponding Motif or X Window component.

▸ **Latitude 1.5.** Quorum will update its kit that lets developers port Mac applications to Unix without rewriting code. The company said Version 1.5 improves display performance by as much as 300 percent on SPARCstations, lets Unix workstations read and write Mac floppy disks, adds support for Motif, and allows Unix compiling of applications written in MacApp.

Applications ported with Latitude run at native speed on Unix platforms, according to Quorum.

Latitude sells for $5,995 plus royalties; upgrades are free.

At its Worldwide Developers Conference last week, Apple showed technology that lets Mac applications run under Unix on platforms from IBM Corp., Hewlett-Packard Co. and Sun. In all three instances, applications ran inside an independent window and used the Mac interface.

Nick Sturiale, Quorum director of marketing, said: "It's difficult to compare our technology with Apple's because it's hard to evaluate a press release. Our developers indicate they want to develop an application stripped of its GUI (graphical user interface). They want to develop applications that run native on Unix with all the performance possible; they don't want an emulator."

Quorum Software Systems Inc. is at 4700 Bohannon Drive, No. 125, Menlo Park, Calif. 94025. Phone (415) 323-3111; fax (415) 323-3113. □

Lexmark puts 600-dpi printing on the network

By Matthew Rothenberg

Lexington, Ky. — Lexmark International Inc. has unveiled a new line of speedy network laser printers.

The IBM LaserPrinter 4039 family, available now, comprises five models ranging in price from $1,599 to $3,399.

The 16-page-per-minute LaserPrinter 4039 16L and 12-ppm 4039 12L ship with support for 500-sheet paper input and handle a maximum paper input of 1,100 sheets; the 12-ppm 4039 12R and 10-ppm 4039 10R support 200-sheet paper input and can be expanded to support 800-sheet input; and the 10-ppm 4039 10D supports 130-sheet input standard, which can be upgraded to 730 sheets with an optional duplexing unit.

In addition to 300-dpi output at their top engine speeds, each of the new printers offers true 600-dpi output to letter- or legal-size paper or transparencies at a rate of 8 ppm.

The printers include an implementation of the Level 1 version of PhoenixPage, the PostScript interpreter from Phoenix Technologies Ltd. of Norwood, Mass., as well as PCL-5 emulation. Each printer ships with 39 Type 1 fonts.

They also include proprietary resolution- and halftone-enhancement software.

At the top of Lexmark's IBM LaserPrinter 4039 family, the 16-page-per-minute 4039 16L includes a 20-MHz RISC chip and supports 500-sheet paper input.

Each device ships with parallel and serial interfaces; LocalTalk, Ethernet and token-ring options range from $299 to $649.

The printers support flash-memory cards for storing printer software and fonts. Flash-memory cards holding 1 and 2 Mbytes cost $289 and $469, respectively.

The 4039 16L includes a 20-MHz AMD 29000 RISC processor, while the other models ship with a 16-MHz AMD 29200 chip. The printers ship with either 2 Mbytes or 4 Mbytes of RAM, and each can be expanded to 16 Mbytes.

Lexmark International Inc. is at 740 New Circle Road N.W., Lexington, Ky. 40511-1876. Phone (606) 232-2000; fax (606) 232-2403. □

For the record

Last week's story on Reports 2.9 gave an out-of-date address for Nine to Five Software Co. Inc. The company is at 1790 30th St., Suite 400, Boulder, Colo. 80301.

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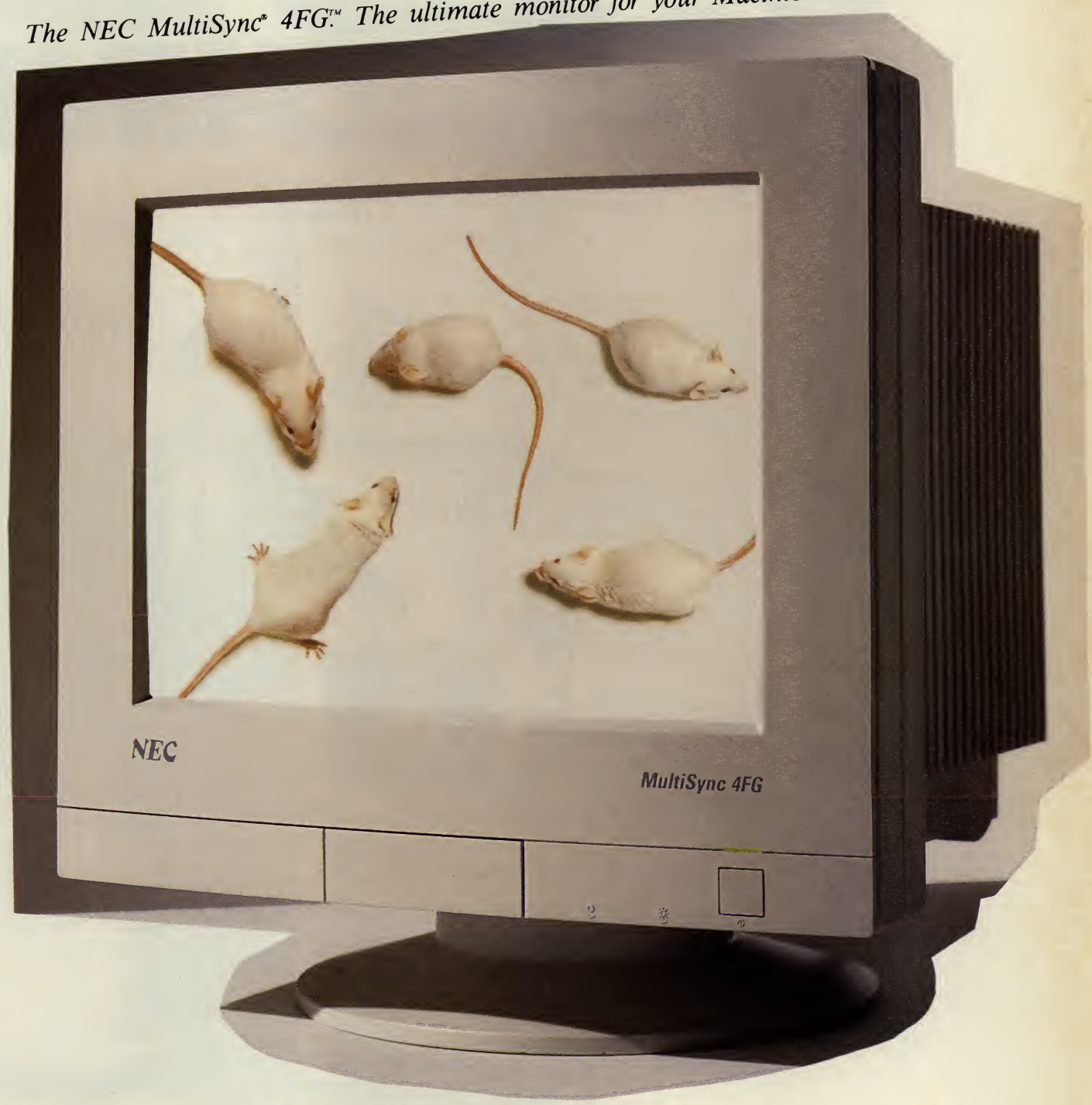

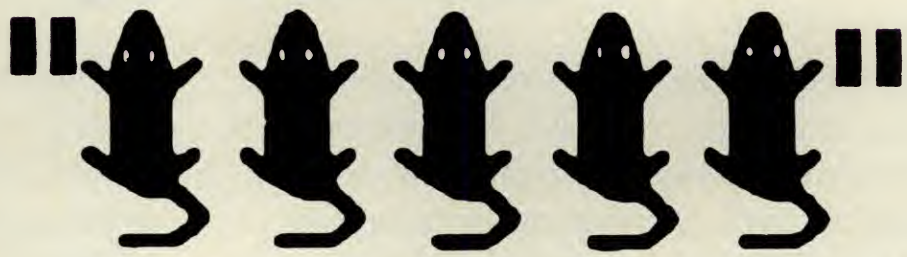

–MacUser Magazine
Aug.'92

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The NEC MultiSync® 3FGx™ monitor.

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In 1992, the only monitor to snag the coveted five-mice rating was an NEC monitor: the MultiSync 4FG. After running it and 13 others through the most rigorous technical evaluation they'd ever used for testing monitors, *MacUser* magazine concluded, "If you're looking for the sharpest display, the NEC MultiSync 4FG should be your top choice." What more can we say? Glad you asked.

Our AccuColor™ Control System prompted *MacUser* to make special mention of the "easy color adjustments." AccuColor lets you adjust on-screen colors, so if you're looking for mouse-tail pink, that's what you'll get.

If, however, color control is not a priority for you, you'll be very happy with NEC's MultiSync 3FGx monitor, which shares almost all of the 4FG's award-winning features. Both monitors produce sharp, bright images, crisp graphics and vibrant colors. An Invar shadow mask provides increased brightness without loss of focus.

Another big idea—the display area. The large 15″ screen (13.8″ active display area) coupled with FullScan™ capability for edge-to-edge images gives you a larger display area than typical 13″ or 14″ RGB monitors.

How do you make an NEC MultiSync monitor work with your Mac? Just plug it in, using NEC's free FG/Mac cable adapter. It works with the Mac's on-board video, so you won't need an add-in video board.*

Both monitors are compatible with the Mac® II family, Quadra™ series, LC's, PowerBooks™ and PC systems. So you can use just one monitor for both types of platforms. *MacUser* noted the "powerful and versatile controls make switching from a Mac to a PC a snap."

And to make these monitors as user-friendly as possible, we've included ergonomic features such as a tilt/swivel base and up-front user controls. Plus, our Reduced Magnetic Field™ technology meets the strict Swedish MPR II guidelines for magnetic field emissions.

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*For Macintosh 640 x 480 resolution, just attach NEC's FG/Mac cable adapter and plug into: Macintosh IIsi, IIci, LC, LCII, IIvx, IIvi, Quadra™ 700, Quadra 900, Quadra 950, Performa™ 400, Performa 600, PowerBook™ 160, PowerBook 180, and the PowerBook 210 and PowerBook 230 with either the DuoDock™ or MiniDock.™ Or with an add-in video card: Macintosh II, IIx, IIcx, IIfx, PowerBook 140, PowerBook 145, and PowerBook 170. Get the 640 x 480 FG/Mac adapter free by calling NEC at (312) 622-7427 8:30AM-5PM CST.

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Actoris puts Contact Pro on the market; app manages data for real estate agents

By Kirsten L. Parkinson

Richardson, Texas — From property statistics to listings, a new program from Actoris Software Corp. will help real estate agents manage information.

Contact Pro, due next month for $495, includes a contact database for storing information about prospects and clients plus calendar and word processing features. The program is based on Blyth Software Inc.'s Omnis database.

When users enter a new listing, Contact Pro automatically pops up a customizable list of related activities to schedule, such as taking photos of the house and visiting the title company.

Users can also import photographs in a variety of formats, including PICT, TIFF and several proprietary digital-camera formats, and link them to specific listings.

A multiple listing service (MLS) feature automatically connects users to a terminal program to log into the local MLS board, which lists all the houses for sale in the area. Users can store property statistics for their area, which are used by the program's option for comparative market-analysis reports.

Other features include the capability to track income and expenses; alarms; and buyer-seller net sheets, which automatically determine the required down payment and various fees for a particular house. A client-server version of Contact Pro will also ship next month, although pricing has not yet been determined.

Actoris Software Corp. is at 1100 Centennial Blvd., Suite 248, Richardson, Texas 75081. Phone (214) 231-7588 or (800) 964-2792; fax (214) 231-6290. □

NoteTaker helps users put their notes in order

By Kirsten L. Parkinson

Truckee, Calif. — NoteTaker Software this month released a $69 application designed to help users take notes and organize them.

NoteTaker users can create and access note topics from an outline. When a topic is opened, any notes linked to that subject are displayed automatically.

The program lets users divide their notes screens into two sections: one for the main notes and another for extra information, such as bibliographic data from a book they are using.

Each section also includes a reminder box where users can keep checklists of items to include in notes on a topic or questions to ask in an interview, for example.

Once a set of notes is complete, users can combine multiple note cards into a single file, called a Narrative. Users can also export NoteTaker files as ASCII text.

NoteTaker is available through June 30 at an introductory price of $34.50. It includes a sample notes file for a tourist guide as well as a book produced from those notes.

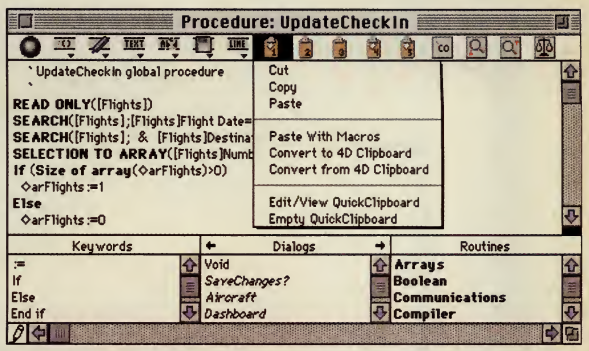
NoteTaker Software is at P.O. Box 10270, Truckee, Calif. 96162. Phone and fax (916) 587-7450. □

QuickCode Pro to let developers import, navigate 4D source code

Tool bar can speed script writing

By Robert Hess

Cambridge, Mass. — The procedure editor in ACI US Inc.'s 4th Dimension might feel like a favorite pair of well-worn shoes to database developers, but Natural Intelligence Inc. hopes to sell those developers a shine and some new laces with its QuickCode Pro.



Natural Intelligence's QuickCode Pro appends a tool bar to 4D's procedure editor, adding multiple clipboards and a macro capability.

QuickCode Pro's externals enhance 4D's procedure editor windows by adding tool bars containing functions to simplify and accelerate script writing.

The program will let developers move text within a document by dragging it, automatically comment multiple lines of code with a single keystroke, set default headers for procedures, quickly navigate documents by setting markers, and search and replace text across multiple windows. It can verify that parentheses, brackets, braces and quotes are balanced.

QuickCode Pro will let users save and load procedures to and from a disk. Without it, 4D users can import code only via the Mac Clipboard.

The program adds five clipboards that maintain their contents between development sessions. It also adds macros that let programmers insert their user name, date, time, or a window or procedure name into a procedure.

Due to ship next month, QuickCode Pro will be $99.95 until Aug. 15 and $149.95 thereafter.

Natural Intelligence Inc. is at 2067 Massachusetts Ave., Cambridge, Mass. 02140. Phone (617) 876-4876 or (800) 999-4649; fax (617) 492-7425. □

ACI updates 4D Calc, Draw, Write add-ons

By Lisa Picarille

Cupertino, Calif. — ACI US Inc. is now shipping updates of its word processor, draw and spreadsheet add-ons for 4th Dimension.

4D Write 2.1, 4D Draw 1.1 and 4D Calc 1.2 now support Version 3.0 of 4D, as well as the multitasking, client-server architecture of 4D Server. Under 4D Server, multiple application modules can run in their own windows; each module can be accessed simultaneously by multiple users.

- **4D Write 2.1** supports Claris XTND technology, adding 14 new translators for reading and writing additional file formats, including Microsoft Word, RTF and FrameMaker.

Version 2.1 lets users set document preferences, including ruler units and document mode. Users can now create style sheets, headers and footers. The upgrade lets users search and replace by attributes as well as by content, and it adds a new page-preview facility.

- **4D Draw 1.1** offers enhanced speed when opening and saving documents. The object-oriented drawing application now sports a redesigned interface. It adds a background layer and the capability to hide and show objects.

Users can also create and edit 4D layouts, forms and views from within the drawing module. Users previously had to go into 4D to modify layouts.

- **4D Calc 1.2** now lets users include references from database components within cell formulas, as well as create entire spreadsheets directly from information in the database.

The modules are $295 each. The upgrade for 4D Write is $25 without documentation and $50 with documentation. 4D Draw and 4D Calc upgrades are free.

ACI US Inc. is at 10351 Bubb Road, Cupertino, Calif. 95014. Phone (408) 252-4444; fax (408) 252-0831. □

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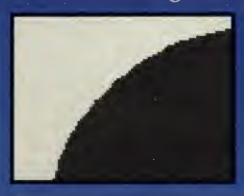

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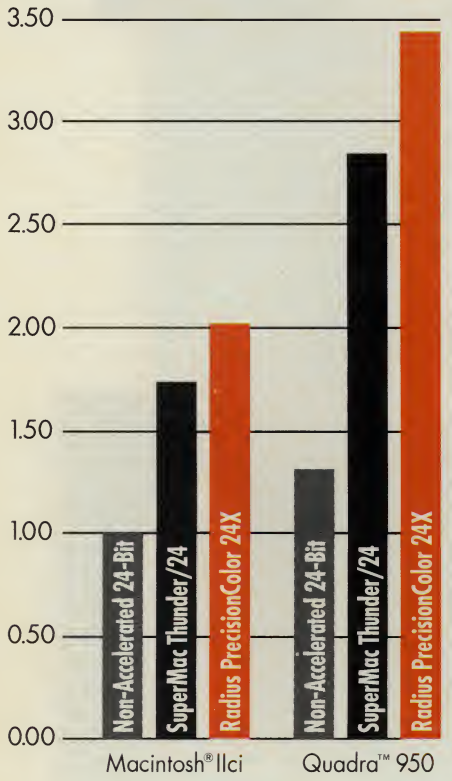

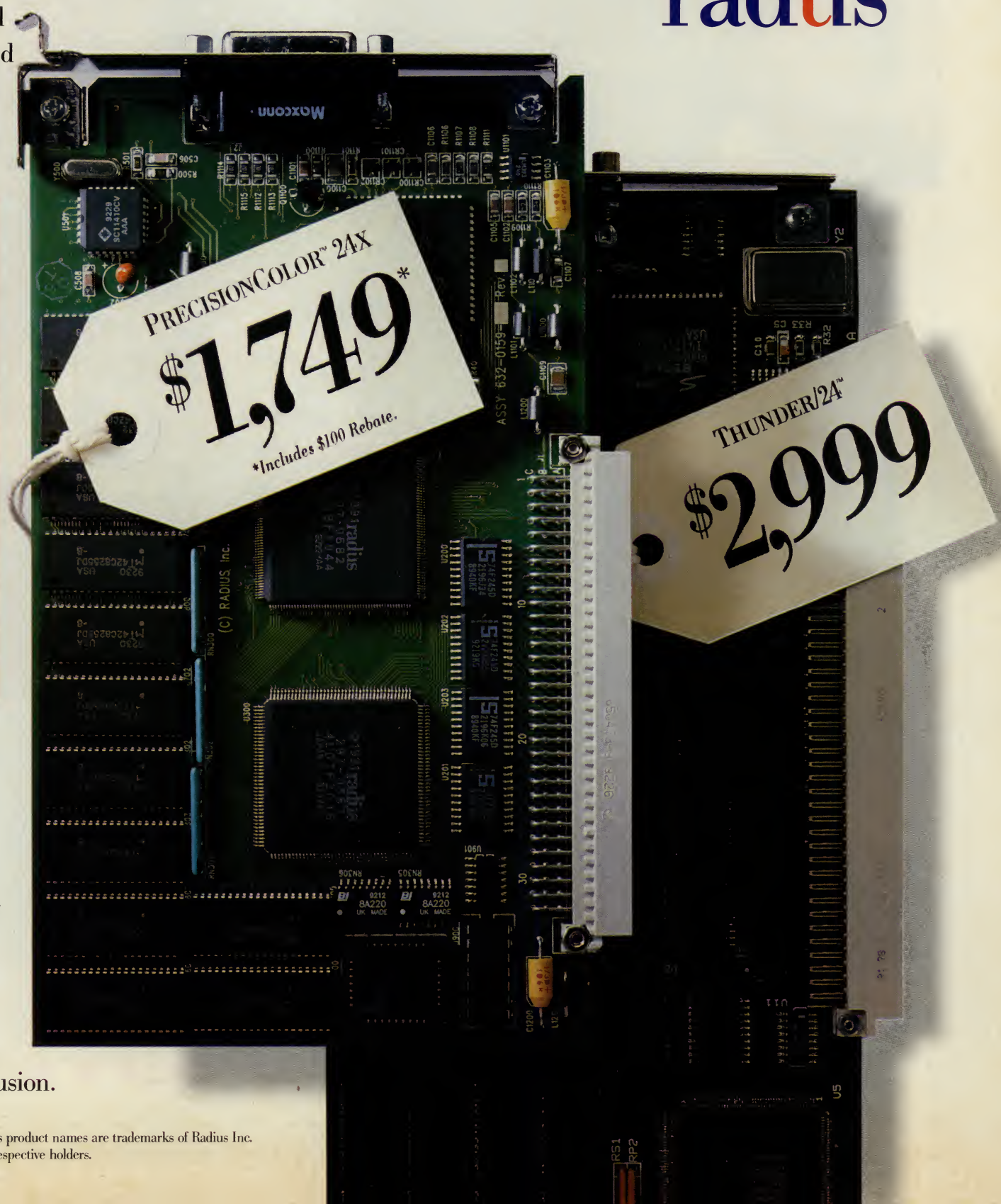

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MicroTouch puts new touchscreen, 14-inch monitor at your fingertips

By Nathalie Welch

Methuen, Mass. — Developers of touchscreen-driven applications can easily marry their programs to MicroTouch Systems Inc.'s new touchscreen monitor for the Mac.

Available now, the $1,495 Mac 'n Touch SA-14 Monitor is aimed at value-added resellers who need a touchscreen to implement multimedia, business or computer-training applications. MicroTouch said the monitor offers a complete plug-and-play developers package rather than a touchscreen kit that would require assembly.

The system is built around the Sampo Alpha Scan II, a 14-inch color monitor with an integrated capacitive touchscreen. The display, which offers a dot pitch of 0.28 mm and a maximum resolution of 1,024 by 768 pixels, is compatible with Apple and other third-party graphics cards.

Mac 'n Touch has front-accessible image controls and ships with a Mac operating system driver. The display will be distributed by Ingram Micro Inc. of Santa Ana, Calif.; according to MicroTouch, previous Mac touchscreens were available only to the OEM market. Volume and dealer discounts are available.

Ben & Jerry's ice cream plant uses the Mac 'n Touch monitor for its visitor information system.

MicroTouch Systems Inc. is at 300 Griffin Park, Methuen, Mass. 01844. Phone (508) 659-9000; fax (508) 659-9100. □

Mass Micro cuts prices on selected drives

By Kirsten L. Parkinson

Sunnyvale, Calif. — Mass Microsystems Inc. this month reduced prices on many of its storage devices, including its Fast SCSI-2 systems and SyQuest drives, by amounts ranging from 1 percent to 16 percent.

The company, which was recently acquired by Ramtek Corp. of San Jose, Calif. (see MacWEEK, Jan. 4), cut the prices of some of its DiamondDrive hard drives by up to $500. For instance, the 320-Mbyte zero-footprint model now lists for $1,279, down from $1,359. The 210-Mbyte DiamondDrive Portable model fell $40 to $719.

Prices on Fast SCSI-2 MASSterDrive systems dropped from 6 percent to 14 percent. The external 2-Gbyte model is now $4,999, a $600 cut, while the 2.8-Gbyte internal drive for the Quadra 900 and 950 was reduced to $5,999 from $6,949.

Selected drives in Mass Microsystems' DataPak removable-media line, which includes both SyQuest and magneto-optical systems, were cut by up to 16 percent.

The 5.25-inch DataPak optical drive, with a capacity of 650 Mbytes per cartridge, now lists for $4,099, a $200 cut. The company's external 88c SyQuest, which reads and writes both 44- and 88-Mbyte cartridges, dropped $50 to $909, while the 44-Mbyte internal SyQuest for the Quadras was reduced 12 percent to $499.

At the same time, the company also lengthened the warranty on all its SyQuest drives from one year to three years.

Mass Microsystems Inc., a subsidiary of Ramtek Corp., is at 810 W. Maude Ave., Sunnyvale, Calif. 94086. Phone (408) 522-1200 or (800) 522-7979; fax (408) 733-5499. □

Orphan Finder hunts down leftover docs

By Raines Cohen

Santa Barbara, Calif. — Have your documents been orphaned by the untimely loss of their parent applications? A program from Tuesday Software can help you track down the leftover files floating around your hard disk and evict them or put them up for adoption.

Orphan Finder, available now at $69.95, scans disks and makes a list of documents, preference files, dictionaries and temporary files created by applications, system extensions, control panels and desk accessories no longer installed. When it finds an orphan, it lets the user either delete the file or select another application to adopt it, changing the creator code.

The program can be run in batch mode on a network or interactively on a single Mac. In network mode, it can run at a preset time and date. Administrators can also see lists of unapproved files.

"I evaluate a lot of programs, and they create a lot of preferences and other files," said Alex Andreatta, senior research scientist and network manager at Uniax Corp., an engineering research company here. "Orphan Finder is very good at pointing out [orphaned documents] and letting you choose whether to delete them or not."

Tuesday offers a 30-day money-back guarantee. Orphan Finder takes advantage of System 7's aliases but also runs under System 6.0.x.

Tuesday Software is at 215 Via Sevilla, Santa Barbara, Calif. 93109. Phone (805) 962-7889 or (800) 945-7889; fax (805) 564-8955. □

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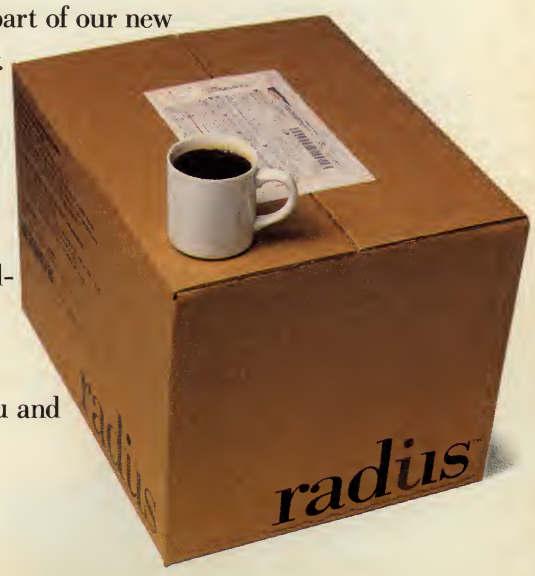

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TorqueWare draws on Indigo, AWS

By Robert Hess

Palo Alto, Calif. — Torque Systems Inc. this month released an update to its "compute server" software, expanding the options of the most power-hungry power users.

TorqueWare is a collection of tools for developers who want to draw on the computational power of RISC and digital signal processing hardware available on systems based on MIPS processors. Once a programmer has implemented support for TorqueWare in an application, it can hand off compute-intensive functions to other computers on the network.

TorqueWare insulates developers from concern over what kind of computer will act as a compute server in the user's network.

TorqueWare 2.0 now supports the Silicon Graphics Inc. Indigo family of workstations, as well as the forthcoming Apple Workgroup Server 95 and the CZAR NuBus accelerators from Integrated Device Technology Inc., a $5,995 NuBus board based on a 25-MHz MIPS R3000 RISC chip.

TorqueWare 2.0 users select TorqueWare servers from the Chooser in a process similar to the selection of AppleShare file servers. In previous versions, administrators needed to custom-configure users' Macs.

Torque provides free libraries and additional software necessary to implement TorqueWare in an application. TorqueWare 2.0 server software is priced at $2,000 per server. Server upgrades from Version 1.0 are free.

Torque Systems Inc. is at 825 Emerson St., Palo Alto, Calif. 94301. Phone (415) 321-1200; fax (415) 321-1298. □

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Norton Utilities			✓	✓	✓
MacTools	✓		✓	✓	✓

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Toolworks World Atlas keeps up with the times

By Ian G. Jacobs

Novato, Calif. — As the world keeps changing, so must computer maps and atlases.

A new updated version of The Software Toolworks Inc.'s World Atlas reflects the changes of borders and political makeup of Eastern Europe and adds new features.

The program, which includes political and topographical maps and data for more than 200 countries, now allows users to add notes to any map.

Users of Version 3.0 can also copy items to the Mac Clipboard and print maps and charts.

In addition, users can add information to the database of facts while viewing a country's flag and listening to its national anthem.

A new Map Trail lets users scroll through the previous 50 maps viewed and mark with icons points of interest.

World Atlas is available on either a CD-ROM for $89.95 or a set of 10 disks for $79.95. Upgrades cost 40 percent of the list price of either version but are free to users who bought the program in the past 30 days.

The Software Toolworks Inc. is at 60 Leveroni Court, Novato, Calif. 94949. Phone (415) 883-3000; fax (415) 883-3303. □

Brainstorm updated

By April Streeter

Mountain View, Calif. — Brainstorm Products last month shipped an installer that upgrades older Macintoshes with the newer versions of AppleTalk needed to run with System 7 and AppleTalk Remote Access.

Macs using Brainstorm's self-named $249 Accelerator for the Macintosh Plus and its $289 Accelerator for Macintosh SE can upgrade to AppleTalk Version 58 using the free Installer.

Version 58 of Apple's network protocol is required for earlier Macs to use services such as ARA. It is also required for some SCSI-based Ethernet adapters and for AppleShare Pro, the A/UX version of AppleShare.

According to Brainstorm, the combination of an Accelerator and AppleTalk 58 allows users to employ Mac Plus machines as low-cost AppleShare or ARA servers.

A Brainstorm Accelerator is required to use the AppleTalk Installer. The program, now shipping, will be included next month in Version 3.0 of the accelerator software.

Brainstorm Products is at 1145 Terra Bella Ave., Mountain View, Calif. 94043. Phone (415) 964-2131; fax (415) 964-2135. □

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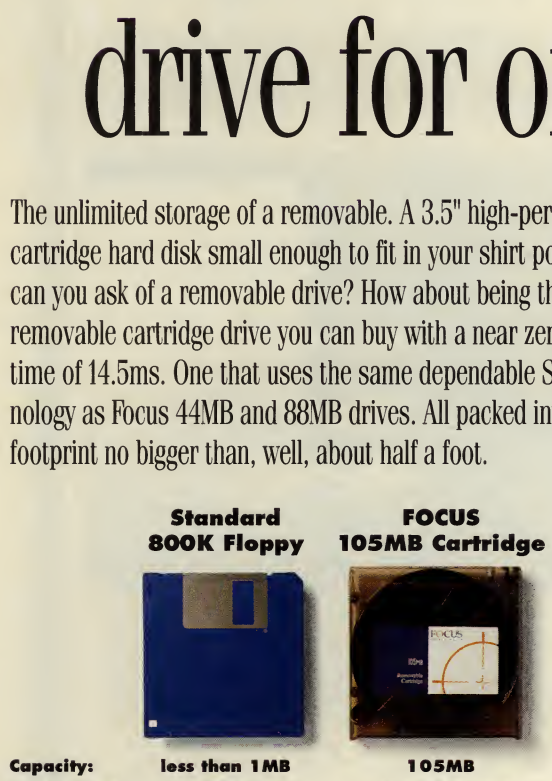

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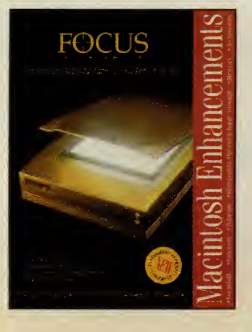

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Rosetta Stone aids language study

By Ian G. Jacobs

Harrisonburg, Va. — Students and workers who want to master foreign languages have a new tool that will help. Fairfield Language Technologies last month shipped The Rosetta Stone, a language-teaching utility.

Aimed at beginning language learners, the program offers immersion-style individualized instruction in English, Spanish, French and German.

The Rosetta Stone combines images, voice and text in progressively more challenging tutorials. For example, one mode confronts users with four digitized photos and asks them to choose the one that matches a printed or spoken phrase. When they are successful, the program proceeds to show a more sophisticated set of pictures.

A dictation section aims to help users develop their ability to write words and sentences in the studied language. A listen-record-play option lets users record their voice for comparison with a native speaker.

Users can select a test mode in which scores, along with program activity records, are stored in a log file.

Beta-tester Bob Grimesey, a teacher at Ottobine Elementary School in Dayton, Va., said the auditory feedback helps users identify words more effectively.

"Non-Spanish-speaking teachers found that this was a neat way for them to develop an ear for the language," he said.

Each language version will sell for $395 ($249 until July 15). A demo CD-ROM featuring full functionality for 12 chapters in each of the five languages is $9.95.

Fairfield Language Technologies is at 122 S. Main St., Suite 400, Harrisonburg, Va. 22801. Phone (703) 432-6166 or (800) 788-0822; fax (703) 432-0953. □

The Rosetta Stone combines pictures, text and recorded speech to help users learn a foreign language.

Board gives Mac Classic presentation power

Seattle — Power R Inc. this month shipped a video board that makes it possible to use the Macintosh Color Classic to drive conference- or classroom-projection systems.

The Power R CC-10, priced at $129, supports a variety of LCD panels offering color or monochrome VGA graphics. The board does not require software drivers.

The system includes a small unit that clips to the video-output chip on the Color Classic logic board. A ribbon cable runs from the clipped unit to a connector protruding from the back of the computer; users can attach an LCD panel to that connector, the company said. The Power R video board delivers 256 colors and a resolution of 512 by 384 pixels. It has a one-year warranty.

Power R Inc. is at 1606 Dexter Ave. N., Seattle, Wash. 98109. Phone (206) 547-8000; fax (206) 285-0260. □

Prosonus adds sounds

North Hollywood, Calif. — Users looking for funky sounds to enhance presentations or just jazz up their desktop have a host of new options, including Ed McMahon and a sick Chihuahua, in Mr. Sound FX.

Developed by Prosonus, the $29.95 Mr. Sound FX incorporates 159 different sounds, some created by Michael Winslow of the "Police Academy" movies, in Sound Edit format.

A customized version of Sound Master, a shareware application, lets users play sounds and link them to Mac functions such as disk eject and shutdown. Users can also convert sound effects into Sound Resource files.

Prosonus is at 11126 Weddington St., North Hollywood, Calif. 91601. Phone (818) 766-5221; fax (818) 766-6098. □

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The image you see over there started out attached to the image you see over here. But as this document made its way down to the printer, the Macintosh it was created on recognized a small problem: 11x17 pages can't fit through 8½ x 11 printers.

And so, out came the electronic scissors.

Now, if you're like many Macintosh users, you know all about this routine. And you know how it feels to walk into a meeting with a layout that contains hours of blood, sweat and tears, and a fat strip of tape right down the middle. Enough said.

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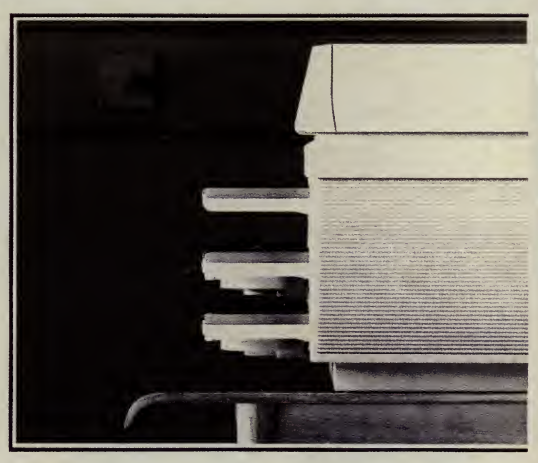

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Sun Clock: World times on desktop

By Ian G. Jacobs

Eugene, Ore. — Businesses that deal with overseas companies can consult a new utility to help them keep track of times and dates anywhere in the world.

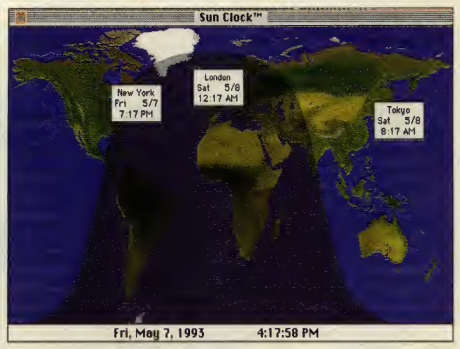
Palo Alto Software Inc. this month shipped Sun Clock 4.0, an update of a program developed and previously sold by MLT Software Inc. of Tigard, Ore.

The $39.95 program displays an eight-bit-color map of the world with an accurate representation of the sun's shadow updated every 11 minutes.

Users can attach resizable note pads containing the correct local time and date at as many as 20 locations. Each note pad can contain phone numbers and addresses of frequent contacts.

Sun Clock can also calculate the distance between any two points on the globe. A new feature called Different Date allows the sun shadow to be changed to reflect the actual shadow at any date and time.

The program ships with screen-saver modules for Fifth Generation Systems Inc.'s Pyro! and Berkeley Systems Inc.'s After Dark. The screen-saver modules rotate a globe image under the sun shadow to prevent screen burn-in.



Sun Clock displays up to 20 resizable note pads with the accurate time and date of any location in the world.

Upgrades from the MLT version are $20.

Palo Alto Software Inc. is at 2641 Columbia St., Eugene, Ore. 97403. Phone (503) 683-6162 or (800) 229-7526; fax (503) 683-6250. □

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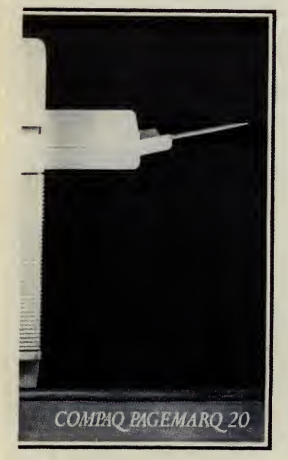

continually download from your Macintosh. You can add 1- and 2-MB Programmable Font Modules, and store as many as 40 additional fonts. Or you can add an internal 60-MB Hard Drive, and store everything from Avant Garde to Zapf Chancery—as many as 1,500 fonts.

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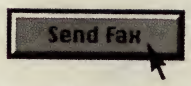

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Smaller JVC models cut CD-ROM recording cost

By Kirsten L. Parkinson

Huntington Beach, Calif. — JVC Information Products Co. of America last month unveiled two low-cost versions of its Personal Archiver CD-ROM recording system.

A half-height internal model for Macs with accessible drive bays is available for $3,995; an external model will ship next month for $4,495.

Both systems include JVC's recorder and mastering software but lack the 680-Mbyte hard drive of the company's external tower model, which now sells for $7,995, down from $9,950.

The system supports three recording modes: standard CD-ROM, multisession and incremental. The latter is a JVC process that creates a single table of contents for multiple recording sessions, allowing the disc to be read by CD drives that are not multisession-compatible.

The Personal Archiver for the Mac supports recording only in Apple's hierarchical file system format. Other configurations of the system are available that record in the International Standards Organization's 9660 and Unix file system formats.

JVC Information Products Co. of America is at 19900 Beach Blvd., Suite I, Huntington Beach, Calif. 92648. Phone (714) 965-2610; fax (714) 968-9071. □

MacTech source code now available on-line

Los Angeles — Xplain Corp. last month launched forums containing extensive Mac source-code libraries on several on-line services.

The company publishes MacTech (formerly known as MacTutor), a monthly developers magazine that includes technical articles and code examples. The companion source code to articles is now available free on the MacTech forums on America Online, AppleLink and CompuServe; previously, users had to subscribe to a monthly disk or purchase a $299 CD-ROM with code and tools.

Xplain Corp. is at P.O. Box 250055, Los Angeles, Calif. 90025-9555. Phone (310) 575-4343; fax (310) 575-0925. □

Management

Corporate Mac user groups can supplement IS functions

In-house MUGs offer help with tech support, training, and exchange of information and ideas.

By Mary Ann Reese

An integral part of the corporate landscape, in-house Macintosh user groups win popularity contests with employees and bosses alike.

Bosses like them because they're an inexpensive way for employees to solve a host of technical problems, to help them know what data exists where within large companies, to reinforce or even supplement training, and to gain proficiency.

Employees like them for those reasons and because they add fun and a human dimension to what can be isolating jobs.

"Like a lonely-hearts club, we come together once a month to share gripes and problems," said Ladell Thomason, president of HallMackers, a 2-year-old Macintosh users group (MUG) at Hallmark Cards Inc.'s headquarters in Kansas City, Mo. "We go away feeling lighter because we know we're not the only one struggling with a problem. We learn who the in-house experts are, where the information is and who to call in the company when the next problem comes up."

In-house groups are multiplying rapidly. Some 225 corporate MUGs are registered with Apple's User Group Connection.

"I wish every corporation had one," said William F. Monteith, executive director of MacIS (Managing Apple Computers in Information Systems) in Mason, Ohio. Monteith said he estimates 25 percent of his 400 members (most of them Fortune 500 companies) have lunch-time brown-bag-type user groups. "You are leveraging your army when you can get a good relationship between a user group and the paid corporate IS support group."

Most corporate MUGs meet monthly, produce monthly newsletters and offer daily electronic-mail help — all on a volunteer basis. Most MUG activities focus on improving employee job performance, bridging information gaps and reinforcing training offered by the corporate IS staff.

Companies recognize the value of in-house MUGs, and they often can be enlisted to help support start-up and operation of one (see story below).

Backup technical support. Question-and-answer sessions are standard fare at MUG meetings. An employee airs a problem; another with an answer offers help. In the process everyone learns who the experts are.

"We get everyone from beginners to gurus at our meetings," said John Beilock, a founder of Disney Co.'s The MacClub in Glendale, Calif., which draws 70 to 100 members at evening meetings every six weeks. "Our user group every once in a while publishes a list of in-house experts, people who agree to answer questions by phone," he added.

LARRY FLEMING

Ladell Thomason and Betsy Rosetti are involved in HallMackers, a Mac user group at Hallmark Cards. Macs are in the minority among the headquarters' 8,000 computers; Thomason said the user group has provided user training and support beyond what the corporation could offer.

"Gurus" at corporations can often quickly answer a question that an IS person may have neither the time nor expertise to answer.

"An employee may have a question on a piece of software that is important but isn't a supported software," said John Grabrick of 3M's Macintosh Special Interest Group (SIG) in Minneapolis. "Our corporate IS may offer standard support for 10 packages. But our user group has in-house experts for five dozen software packages — everything from databases to multimedia to spreadsheet programming and graphics design. Employees call the official support first, of course. But when they can't help, someone in the user group usually can."

At 3M, a directory of willing, lay in-house experts is published in monthly newsletters. "These in-house volunteer technical wizards save the company a lot of money," Grabrick said.

E-mail or user-group electronic bulletin boards offer day-to-day help for technical questions.

Although Amdahl Corp.'s MUG in Cupertino, Calif., meets infrequently, "we have a large electronic bulletin board with questions and answers," said Audrey Meyers, the group's ambassador. "How do I do tables in Word?" or "I just bought a great product; here's a review of it," are typical exchanges. She figures that more than 100 messages, comments, questions, answers and announcements are posted every month.

Aiding communications. Instant dissemination of information is another benefit of MUGs and their bulletin boards.

Meyers said: "When a corporation or a nearby vendor offers training programs, I'm able to send out an immediate notice to all users — 400 plus. We also use [the BBS] to share resources. If one department gets new computers, their old ones might be just the ticket for another department, saving the company money."

MacIS Director Monteith said user groups also help in sharing information about corporate data.

"You have to use people-to-people relationships to spread news about what data exists where, so people in the corporation can make the proper, best-informed decisions," he said. "User groups are the best way to do this, period."

Monteith, who encouraged user groups when he was CEO of Armco Inc. of Middletown, Ohio, offered this example: "In a manufacturing company, people responsible for sales might not have access in a simple form to what's

See Management, Page 20

The do's and don'ts of starting a corporate MUG

Interested in forming your own corporate user group? Here are some suggestions from leaders of existing corporate MUGs:

- Start one! Your company needs you, even if it has a corporate Macintosh IS department with paid employees to answer questions and solve problems. The MUG can help disperse the support load and distribute unofficial information the department cannot provide.

You should also investigate affiliating with a community group in your area or a national group; many support a number of corporate chapters and can give you a platform of basic services, such as meetings and newsletters, that you can build on with company-specific items.

- Call Apple's User Group Connection for a free copy of its user-group start-up kit, which includes the 30-page JAWs (Just Add Water) workplace-edition registration kit. It offers everything from sample bylaws to advice on determining the right focus for your group. Call (800) 538-9696, Ext. 500.

After you form a group and register it with Apple, the company will send you bimonthly newsletters; twice-a-year videos demonstrating new developments; and samplers of Apple CD-ROMs, technical notes and data sheets.

- Spread the workload. If you're going to be the one who makes it happen, try to identify other people to share your workload so you don't burn out.

Group leaders at a number of Mac-using companies in San Francisco last year banded together to form SanFAUG, a multicompany corporate user group.

The combined group draws large crowds, which helps attract high-quality speakers, and the work is spread out among many people from several companies.

- Meet on a consistent schedule, with meetings at the same time and, if possible, the same location, each week, month or quarter.
- Advertise meetings via newsletters, electronic mail and posters.
- Make meetings informative and fun. For example, hold raffles, an annual fair, an annual game day or a monthly "game preview"; or negotiate discounts for members with local outlets.
- Consult your company's legal counsel before doing things such as offering free software or other giveaways. Some corporations have strict rules forbidding such activities.
- Seek corporate cooperation for MUG meetings. Explain how meetings will benefit the company so you can win the best possible support. — By Mary Ann Reese

The new 3.5" removable

Infinity 105 Turbo S
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The Infinity Turbo 105 S sets a new standard in Winchester, removable storage. It is the smallest, yet fastest removable drive around, allowing you unlimited storage capabilities by simply adding additional 105MB cartridges.

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In short, the Infinity Turbo 105 S offers a realistic storage solution for storing multi-media, desktop publishing and database files. And for dependability you can trust, the Infinity Turbo 105 S utilizes time-proven Winchester technology - the same reliable technology used by your fixed hard drives.

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PLI

Management

From Page 18

available in inventory on the manufacturing floor.

"By sitting down and understanding what others need to do their job, by sharing this kind of information, user groups can play an important role in bridging such gaps," he said.

Cross-fertilization benefits. Corporate MUG members are resources in ways beyond problem solving, too.

NASA employees in Washington, D.C., often take center stage at meetings, demonstrating software they've created or showing innovative ways they use third-party software.

During meetings, experts from neighboring user groups may also demonstrate their uses for particular programs. Artists from the Smithsonian Natural History Museum recently showed NASA MUG members how they create animal drawings or map the Peruvian rain forest on their Macs. Pentagon MUGers shared uses in the military environment.

"Getting perspectives from different disciplines and seeing how neighboring colleagues look at and solve problems expands our own visions of what's possible," said NASA's Dave Lavery, a telerobotics program manager and chairman of the NASA Headquarters Macintosh Users Group.

At Motorola Inc., which is so big that divisions are spread throughout the Phoenix Valley in nine major facilities, interplant communications take on a special relevance. Dan Griffith, founder and director of MACS (Motorola Advanced Computer Society), said: "Because we have several divisions and each division has several plants, the puzzle is who in another division might have already solved a problem that somebody in a plant across town is struggling with today. Our user group often knows — because of the networking that goes on at meetings, because of the question-and-answer sessions, and because of the demonstrations and talks at meetings by in-house experts. It's a tremendous resource for the company."

Vendor demos. Another routine of user-group meetings are demonstrations of upgrades or new products by vendors. While an obvious benefit is that this keeps employees more up-to-date on advances that may help them in the workplace, there's a spin-off benefit as well.

"Vendor-led meetings put users directly in contact with vendor representatives who can help them and give them technical support in the future," said Motorola's Griffith. "Business cards are exchanged, and when a problem comes up, the employee knows where to go for help. He has a number that is more specifically useful than a generic 800 number."

Vendor fairs, also popular with corporate user groups, often feature 30 or more vendors for one or more platforms at a one-day gathering.

"Fairs offer more one-on-one opportunity than the single-vendor demo," Griffith said. "Employees can ask individual questions of vendors, specific to their needs, and can get hands-on use of products new on the market. Here, again, business cards get exchanged, and an employee adds yet another back-up to his Rolodex for when a problem surfaces."

Help for minority Macs. In corporations where Macintosh computers are a minority, user groups, aided by vendor speakers, can provide training and support that wouldn't make sense in corporate budgets.

That is why Hallmark's Hall-Mackers got started. MUG President Thomason said Hallmark has about 500 to 1,000 Macs amid a corporate headquarters computer population of 8,000.

"We needed additional user training and education beyond what we could get here at Hallmark," Thomason said. "There wasn't a formal program to equip Mac users across the company. So we formed a group as a stopgap measure, to help people who wanted Mac training and who needed help beyond what our MIS division could give.

"Our 90-minute lunch-and-learn monthly meetings provide as much education and support as we can organize. Usually a vendor comes in to demonstrate a product. Then someone from within the company shows how they use the same program, so other employees can see how a program is, being just down the hall. That works pretty well."

Having fun. And finally, corporate user groups help remind users that a Macintosh can be fun.

"We make sure one meeting a year is entertainment-related," said 3M's Grabrick. "After all, clubs started for at-home activities and then migrated to take care of things at work. Definitely, having fun is part of getting the job done." □

A user group for scientists and engineers

Mac users in technical fields have specialized concerns that aren't always addressed by either in-house information systems departments or corporate MUGs.

MacSciTech, a 2-year-old Mac user group for scientists and engineers, was created to fill that breach. At last count, it has 1,500 members hailing from 12 nations.

"Nobody else was meeting our needs," said Executive Director Shari Worthington. "At typical user groups, you find people who tend to use business applications, spreadsheets, word processing, general-purpose stuff. It's hard to find anybody covering data acquisition and control, digital signal processing, or CAD/CAM.

"So we started MacSciTech to swap war stories and share information on what kinds of products are available."

The resulting far-flung user group publishes The SciTech Journal, a 32-page bimonthly newsletter. The journal includes technical articles and application stories about how people use Macs for machine-tooling applications, chemical processing and other technical applications.

Members include Mac users from the aerospace, pharmaceutical, manufacturing, university and government-research sectors.

MacSciTech hosts annual technical conferences; this year's will coincide with Boston's Macworld Expo in August. The $50 annual membership includes newsletters and a list of specialists available to solve problems with members on the phone. It also offers a reduced price on a CD-ROM containing abstracts and QuickTime videos from the annual technical conference.

MacSciTech is at 49 Midgley Lane, Worcester, Mass. 01604. Phone (508) 755-5242.

— By Mary Ann Reese

Calendar of Events

MAY

22: MacFair, New York. General Macintosh show with art exhibition of computer-created art. Full exposition room devoted to software demonstrations. Contact New York MacUsers' Group at (212) 473-1600; fax (212) 473-1745.

24-27: Comdex/Spring '93, Atlanta. Smaller version of world's largest computer show. Expo and conference are combined with Windows World. Contact Interface Group at (617) 449-6600; fax (617) 449-2674.

24-28: ESRI's Annual Conference, Palm Springs, Calif. The 13th annual conference for users of ESRI's geographic information systems software will include minitraining workshops and vendor exhibits. Contact ESRI at (909) 793-2853; fax (909) 793-5953.

25-27: NeXTWORLD Expo, San Francisco. Developer and user conference for the NeXTstep operating system with an end-user product showcase. Contact User Group Services at (508) 470-3880 or (800) 767-2336; fax (508) 470-0526.

25-27: NetWorld, Frankfurt, Germany. Show on networking and interoperability. Contact National Blenheim Expos Inc. at (201) 346-1400, Ext. 473 or (800) 829-3976, Ext. 473; fax (201) 346-1602.

JUNE

1-5: Seybold Paris. Showcase and conference on electronic publishing, including multimedia, video and graphics. Contact Seybold Seminars at 44-32-341-0561 or (800) 777-6650; fax (310) 457-8500.

3-6: Consumer Electronics Show, Chicago. The ultimate expo for home electronics, gadgets and computers. Last year Apple introduced Newton here. Contact the Electronic Industries Association at (202) 457-8700; fax (708) 344-9018.

5-11: DECUS '93, Atlanta. Semiannual Digital Equipment Corp. show consisting of trade show, national seminars and symposia. Contact DECUS U.S. at (508) 841-3341 or (800) 332-8755; fax (508) 841-3373.

7-9: PageMaker Conference and Exhibition, Seattle. Show focusing on graphics and multimedia in computer publishing with special focus on Aldus PageMaker. Contact Open House at (206) 633-3431; fax (206) 633-0153.

7-11: DIDOT Works II, Rochester, N.Y. Workshops and lectures on digital type production, marketing and applications. Contact Goudy International Center at (716) 475-2052; fax (716) 475-7029.

8-10: A/E/C SYSTEMS '93, Anaheim, Calif. Trade show for the design and construction industry with special area for software demos of AutoCAD-compatible software. Conference will also cover Geographic Information Systems applications. Contact DesCon at (203) 666-6097 or (800) 451-1196; fax (203) 666-4782.

11-12: MacFair LA '93, Los Angeles. Southern California's Macintosh show. Exposition and conference co-sponsored by Apple. Contact Los Angeles Macintosh Group at (818) 574-8047; fax (818) 574-5028.

Please submit notices of conferences, trade shows and other Mac-related events to: Calendar, MacWEEK, 301 Howard St., 15th floor, San Francisco, Calif. 94105, or fax to (415) 243-3650. No training or educational seminars please.

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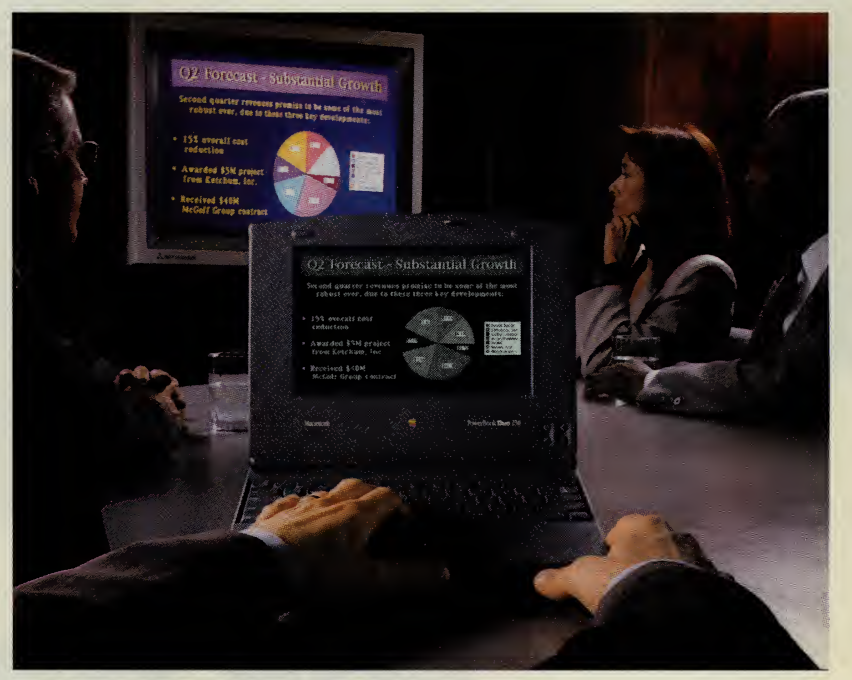
8:00 Home *Over breakfast, you check your calendar on your PowerBook Duo. The day looks like it'll be a breeze. You'll put a few finishing touches on the Q2 forecast presentation that's due in a couple of days, return a few calls, and have a free afternoon (for a change).*

9:15 Your Office *You slide your PowerBook Duo into the Duo Dock and start working. Suddenly, your e-mail chimes. Your boss wants you on the noon shuttle to Boston, to present the Q2 forecast to* his *boss. Also, a client wants to see you ASAP. You hit the eject button and go.*

2:50 Borrowed Office *A colleague is at lunch, so you borrow his Duo Dock. You log onto e-mail back at the home office and learn your group has just won a new piece of business. You incorporate this news into your presentation (and change a few colors while you're at it).*



3:30 Conference Room *You clip on the Duo MiniDock and run the presentation from your PowerBook Duo. Everybody's impressed — especially the guy who asks you a series of tough questions about a six-month-old project. You've got all your files, so you've got all the answers.*

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For years, you've been trying to keep up with computers. Now there's a computer that can actually keep up with you: the Apple® PowerBook Duo™ System.

It's nothing less than the most flexible, adaptable and personal computer in the world.

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Model	PowerBook Duo 210	PowerBook Duo 230
Weight	*4.2 pounds*	*4.2 pounds*
Memory	*4MB exp. to 24MB*	*4MB exp. to 24MB*
Storage	*80MB*	*80MB or 120MB*
Display	*9-inch backlit*	*9-inch backlit*
Battery	*Up to 4.5 hours*	*Up to 4.5 hours*
Speed	*25 MHz 68030*	*33 MHz 68030*

In the office, when plugged into a Duo Dock, it instantly becomes a fully expandable, no-compromise desktop computer that lets you work with a full-size keyboard and up to a 16-inch color monitor.

But what really sets the PowerBook Duo System apart from conventional docking systems is a bit of engineering genius called PowerLatch™ technology. A combination of elegant hardware and intelligent software that

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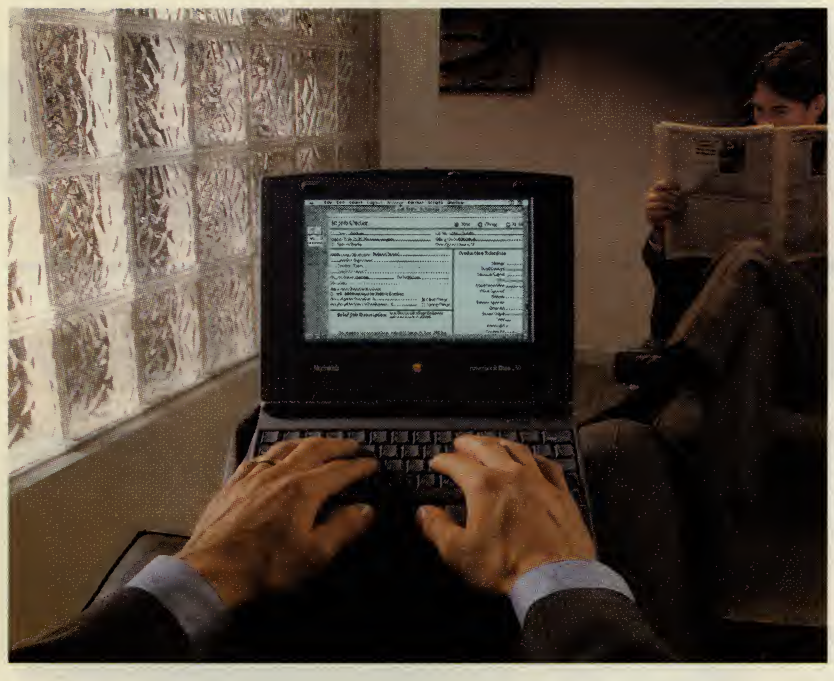
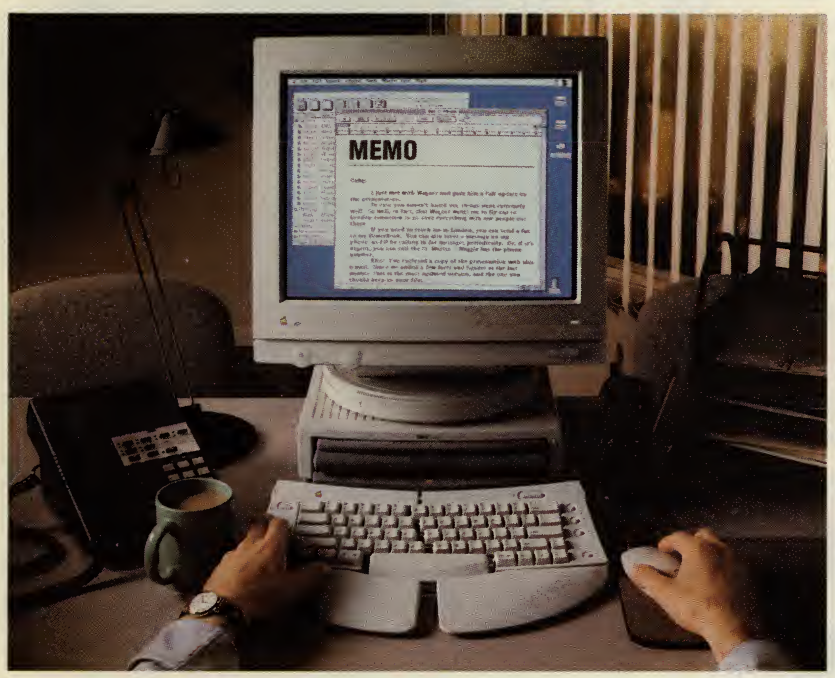


11:10 Your Client's Office *That $5 million project the client told you was off last week? It's on again. And due in two weeks. You type up a few job orders, which you'll fax from your PowerBook when you get to Boston. Now, however, you have to catch a cab for the airport.*

12:40 Noon Shuttle *All the files and software you use at your desktop are right here with you. You pull up the Q2 presentation and make the revisions to reflect the new assignment. Then you write a quick memo to your team, to make sure that everything's on schedule.*



7:00 Your Office *On the way home, you swing by the office to tie up a few loose ends. You see your boss. He heard the meeting went extremely well, and wants you to fly out and present to the people in London. Tomorrow. You send out a quick memo to update your staff.*

8:30 Living Room *Since you've got all your files and software right there with you, you could write a report, study the new research data or finish up those performance reviews. But hey, enough is enough. You settle back in your recliner and play a few rounds of Tetris.*

you through a day like this.

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Gateways

- Networking
- Communications

AppleShare 3.0.2 patch to correct archiving bug

By Robert Hess

Cupertino, Calif. — Apple is preparing to release an update to its AppleShare file-server software to fix a few bugs and improve performance on some servers. The new version is expected by mid-June.

AppleShare Server 3.0.2 is a new version of the File Server Extension. The AppleShare Server application is not modified.

Apple will distribute a patcher to install the new version. The patcher will be available on AppleLink, through Apple's support organization and via third-party developers whose products will benefit from the revision.

Version 3.0.2 fixes a bug in prior versions that prevented some backup software from properly archiving the Users and Groups file, which stores server security information.

Version 3.0.2 also resolves possible incompatibilities with third-party AppleShare server-management software, such as Sonic Systems Inc.'s Server Sentry and Technology Works Inc.'s GraceLAN Server Manager.

Performance of some servers may improve with the new version because of an increase in the number of simultaneous user requests the server will handle.

The new version can improve performance on servers with a large number of users and considerable traffic, as well as servers accessed by users via slow network connections, such as AppleTalk Remote Access.

In both situations, when the server is handling its maximum number of requests, it appears to users to be frozen. □

Apple, Shiva to develop remote-access technology

New products will use PPP standard

By April Streeter

Cupertino, Calif. — Apple and Shiva Corp. this month announced a partnership aimed at implementing a remote-access transport method that will treat Mac, Unix and Windows users as equals.

The two companies will develop technology based on the Point-to-Point Protocol (PPP), an industry standard for serial-line communications, and will incorporate the advancements in separate products.

Apple plans to offer a PPP client for AppleTalk Remote Access (ARA) at an unspecified date, while Shiva later this year expects to roll out a multiport, remote-access server that supports the ARA PPP client as well as Windows and Unix users with Shiva client software.

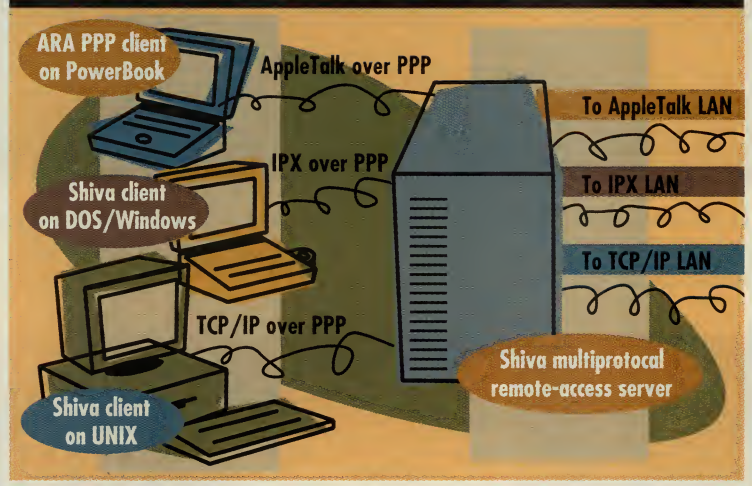
The combination of PPP clients and a PPP-supported server would eliminate the need for network managers to maintain different devices for Mac, Windows and Unix users dialing into mixed AppleTalk, IPX (Internetwork Packet Exchange) and TCP/IP networks.

In contrast to the proprietary AppleTalk Control Protocol that functions as ARA's transport mechanism, PPP is an Internet Engineering Task Force standard that uses encapsulation to transport a variety of LAN protocols. Each protocol that PPP supports requires a Network Control Protocol, or NCP. The specifications for the NCP for AppleTalk over PPP are publicly available, and vendors such as Centrum Communications Inc. have hinted at products, but Shiva's implementation is the first to be officially endorsed by Apple.

Shiva already has a PPP Windows client that it said was based on ARA's design; the company also said it will deliver a Unix-based PPP client by year-end.

The PPP version of ARA will be extensible via an application programming interface that will let third-party vendors develop extensions, such as a security extension, for the program, according to Shiva. □

Remote access crosses platforms



IPX stack to allow NetWare integration sans AppleTalk

By April Streeter

San Jose, Calif. — Novell Inc. last week delivered an IPX protocol stack for the Macintosh that will let network managers integrate Macs into NetWare networks without using AppleTalk.

The MacIPX Software Developer Kit, introduced at the Apple Worldwide Developers Conference, is available for $295. It allows developers to write cross-platform applications that will use Novell's IPX (Internetwork Packet Exchange) protocol as their transport rather than AppleTalk or TCP/IP. Developers may include IPX in their end-user applications without paying royalties to Novell.

Novell cited a number of Macintosh applications that will soon emerge in IPX incarnations, including Claris Corp.'s FileMaker Pro and CE Software Inc.'s QuickMail. Caravelle Networks Corp.'s NetWORKS 3.0 network-management platform already includes MacIPX support.

"A Mac user can buy this copy of FileMaker and get everything he needs to show up on a Novell [NetWare] network," said Dennis Marshall, Claris database product manager. "[IPX] is by far the dominant network protocol, and with it network managers don't have to run separate [AppleTalk and IPX] networks. It won't supplant AppleTalk, but it lets corporate accounts standardize, which they love to do."

The MacIPX package includes a set of application programming interfaces (APIs) necessary for Macintosh programs to use IPX and SPX, the Sequence Packet Exchange, as their transport method.

For NetWare 2.x and 3.x, APIs that allow Mac applications to query the NetWare bindery are included with the stack; for 4.x environments, the bindery emulation provided in NetWare for Macintosh 4.0 will be required.

Novell's delivery of the protocol is the first in a four-step strategy to give the Mac equal footing with DOS, Windows and Unix clients in NetWare environments. Later this year, the company will deliver a further set of APIs that allow development of richer Mac client access to 4.x services as well as Mac clients for the forthcoming Personal NetWare.

Personal NetWare, a new incarnation of NetWare Lite with the addition of virtual server technology, will be delivered in 1994, Novell said.

Novell Inc. is at 122 East 1700 South, Provo, Utah 84606. Phone (801) 429-7000 or (800) 453-1267; fax (801) 429-5155. □

Mac apps with IPX support

COMPANY	PRODUCT	SUPPORT DATE
Caravelle Networks	NetWORKS 3.0	Now
Claris	FileMaker Pro 2.1	Q2
Digital Communications Associates	Irma Workstation for Macintosh 3.0	n/a
Meridian Data	NetScribe 1.0	Q3
NetMagic Systems	StressMagic	July
Pastel Development	DayMaker	This year

FlexCom lets Mac users create their own terminal sessions

By Nathalie Welch

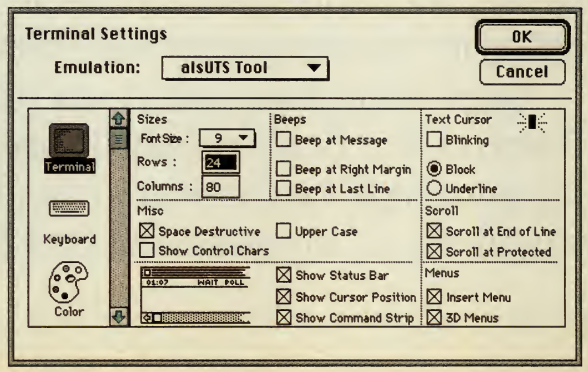
Fairfax, Va. — Air Land Systems Corp.'s FlexCom puts the power to communicate squarely in the hands of Mac users by letting them create customized terminal sessions to access a variety of hosts.

Based on Apple's modular Macintosh Communications Toolbox architecture, FlexCom lets users construct communications preference files by choosing from terminal, file transfer, connectivity and electronic-mail tools. The individual tools, most of which are available now, come as separately priced modules that reside in the Mac's Extensions folder.

Any Macintosh Communications Toolbox-aware application, such as

See FlexCom, Page 26

FlexCom lets users construct terminal-emulation programs by choosing from a list of terminal, file transfer and connectivity options.



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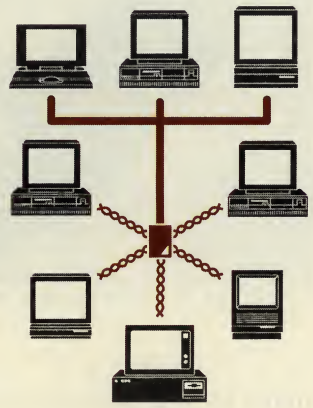

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Macs get multiline call processing

By Nathalie Welch

Sunnyvale, Calif. — Mac users will be able to create and run multiline call-processing applications, thanks to a recent pact between Cypress Research Corp. and Dialogic Corp.

The Cypress Telephone Tool for AppServer, a software module due from Cypress by year-end, will enable single-line call-processing programs created on the Mac to be scaled to a multiline application that uses Dialogic's multiport call-processing hardware on an IBM PC or compatible. Previously, Mac-based call-processing applications were limited to single-line systems, Cypress said.

Residing in the Mac's Extensions folder, the Cypress Telephone Tool can support customized call-processing applications that integrate with other Mac technologies. Potential applications include voice messaging and voice-response database access.

Cypress will offer the Cypress Telephone Tool as an add-on to its $950 PhonePro telephony applications builder; it may also sell the software separately, at an undetermined price.

To create telephony applications for use with the Cypress Telephone Tool, users need Cypress' PhonePro telephony applications builder or other applications that interface with Apple's Macintosh Telephone Manager, a system extension that lets the Mac understand touch-tone signals.

Dialogic's AppServer voice-processing board for PCs sells for $1,150.

Cypress Research Corp. is at 240 E. Caribbean Drive, Sunnyvale, Calif. 94089. Phone (408) 752-2700; fax (408) 752-2735. □

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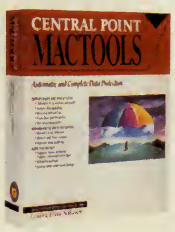

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InterCon backs SLIP

By Nathalie Welch

Herndon, Va. — InterCon Systems Corp. last week began freely supplying Mac users with software designed to help manage multiple SLIP gateways to the Internet.

InterSLIP stores parameters of each Serial Line Internet Protocol (SLIP) gateway, such as IP number and Nameserver addresses, which relieves users from having to reset their MacTCP software each time they connect to a different network. InterSLIP then automates much of the process of making the connection to a SLIP server.

InterCon is bundling InterSLIP with all its products, as well as making it available by anonymous FTP (File Transfer Protocol) from ftp.intercon.com, and on America Online and AppleLink on-line services.

The SLIP defines how Internet traffic is sent over an asynchronous serial-line connection such as a telephone line. A SLIP server is the functional equivalent of an AppleTalk Remote Access server in that it provides access to TCP/IP networks.

InterCon Systems Corp. is at 950 Herndon Parkway, Herndon, Va. 22070. Phone (703) 709-9890; fax (703) 709-9896. □

FlexCom

From Page 24

Apple's MacTerminal or Microsoft Works, can use these preferences to run terminal sessions. The number of concurrent sessions a user can run is restricted only by the Mac's memory limitations, according to the company.

Air Land licenses several Apple tools, such as the Apple TTY/VT-102, ADSP (AppleTalk Data Stream Protocol) and Serial tools, and provides them free to FlexCom customers; the Apple ISDN (Integrated Services Digital Network) connectivity tool, however, is $50. Other modules used to connect to Unisys, Honeywell Bull, IBM 3270 and AS/400, and DEC VAX hosts are sold separately and range in price from $50 to $195. Most of the modules are available now with the balance due by the end of June.

Air Land offers two communications applications to get users started: the $50 ALS Connect basic package and the $370 asc 5PM 1.1.5, a feature-rich application that includes a graphical user interface developed by Advance Software Concepts of France.

Air Land also supplies some of the hardware necessary to make the connections, such as NuBus boards.

Air Land Systems Corp. is at 2710 Prosperity Ave., Fairfax, Va. 22031-4387. Phone (703) 573-1100 or (800) 247-5263; fax (703) 573-0121. □

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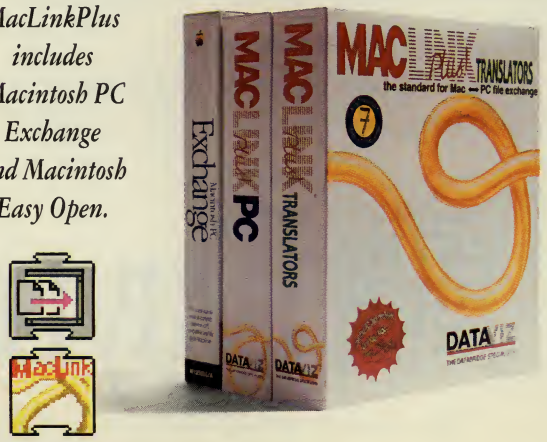

In addition to providing you with transfer capability, MacLinkPlus also translates files transferred via other methods. Such as disk mounting utilities like DOS Mounter and AccessPC, MS-DOS emulators such as SoftPC, and network software such as NetWare and LANtastic. Let MacLinkPlus do the work of converting foreign files transferred with these products into the exact format you need. MacLinkPlus/Translators contains the full translator library, Macintosh PC Exchange and Macintosh Easy Open. While MacLinkPlus/PC has all of these, it also allows you to connect a Mac and PC with the included serial cable or via modems.

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Wide-Area Networks

Across town or across country, wide-area networking is a mainstream extension to familiar LANs. Practically all large companies, as well as many small and medium-size ones, need to exchange data among sites. In this Special Report we look at traditional and emerging options for long-distance bandwidth.

ILLUSTRATIONS BY SCOTT BALDWIN

Inside

Move over modem: Making the jump from analog to digital telecommunications *Page 30*

The wave of the future is packets: Frame relay, SMDS and (eventually) ATM *Page 32*

Apple's flirtation with ISDN *Page 36*

By Jeff Ubois

Applications, topologies and services are all interconnected issues for today's WAN manager.

A favorite conundrum of mathematicians, known as the traveling-salesman problem, asks for the shortest route a salesman can take between a number of geographically dispersed cities. Simple as the question sounds, finding the answer is difficult enough to require sophisticated neural networks to solve the problem in any reasonable amount of time.

Network managers charged with connecting locations around the country and world into wide-area networks probably wish they had similar algorithms to solve their connectivity problems.

In addition to having to physically configure their networks, they face a dizzying array of issues: what applications to support, what protocols to use, what equipment to buy and how to configure their networks to prepare for new user demands. WAN managers quickly realize there is no magic bullet that will solve them all.

WANs are not big LANs. Some rules of thumb have built up around the construction of WANs. No. 1 is that WAN-based applications are more limited and more expensive than LAN-based ones.

"Never assume your networked applications will be the same as your workgroup applications," said Tom Nolle, president of CIMI Corp., a Voorhees, N.J.-based consulting company. "Backup over a WAN could be a suicidal strategy, and you usually wouldn't want to run a client against a WAN-connected server because performance is going to be poor."

High-end users are already aware of the problems of moving LAN applications onto their WANs. "The WAN is not meant for the same traffic as the LAN," said Russ Reynaga, senior member of the technical staff at Pitney Bowes Inc.'s Shipping and Weighing Systems Division in Shelton, Conn. "The WAN is used for electronic mail, file transfers or keyboard/terminal traffic. You certainly wouldn't want to do X Window [applications] from LAN to LAN because they eat up too much bandwidth."

Building the pyramid. WAN services form a pyramid of increasingly sophisticated, demanding and costly applications. E-mail, which requires relatively little bandwidth and is cheap to set up and maintain, comprises the foundation. Terminal emulation, the next level, involves additional client software but not much else.

At the next steps, file transfers may require higher WAN speeds, and transaction systems will demand more-sophisticated software and security measures.

At the top of the pyramid, serious client-server applications require not only greater bandwidth but also more-sophisticated software on both ends and more-complex networking schemes.

"Simply doing over the internet what you do locally is not a sensible strategy," Nolle said. Instead, managers should start at the bottom of the pyramid and work up, selecting network technologies that provide desired levels of service and offer migration paths to the next level.

Even companies with very large and sophisticated WANs are still working their way up from the bottom of the pyramid. Hughes Aircraft Co. of Fullerton, Calif., uses its WAN to support E-mail traffic between a dozen large sites around the world, which are tied together with T1 and 56-Kbps lines.

The network has to support a half-dozen E-mail programs and a number of gateways between them and long-distance mail services, such as SprintMail, MCI Mail, an X.400 backbone and the Internet. "We are not a one E-mail house," said Mark Goldenberg, senior system support engineer at Hughes.

While the Hughes WAN primarily services E-mail and file transfer traffic, higher-level services are becoming popular. "We're doing some transaction processing and terminal emulation," Goldenberg said. "There's not a great deal of client-server-type traffic since most database-access users are just logging in as terminal sessions."

Transport services. Determining what applications must be supported is just the beginning. Network managers can't long avoid the thorny issues of choosing the WAN services that will transport their data.

The WAN services offered by the regional Bell operating companies (RBOCs), long-

See WAN, next page

SWITCHED 56
Speed: 56 Kbps
Availability: Now
Providers: All RBOCs and long-distance carriers

FRACTIONAL T1
Speed: Multiples of 64 Kbps
Availability: Now
Providers: Most carriers

T1 AND T3
Speed: T1, 1.54 Mbps; T3, 45 Mbps
Availability: Now
Providers: Most carriers

WAN

From previous page

distance carriers and others form a hierarchy that parallels the one for applications.

Simple dial up over voice-grade lines is useful for most E-mail and some low-speed terminal-emulation and file transfer applications.

"AppleTalk is relatively slow, and so a lot of the WAN needs for customers using AppleTalk can be dealt with using the voice network," said Mark Langner, senior analyst with TeleChoice Inc., a Verona, N.J.-based consulting company.

Dial-up lines are also appropriate for ad hoc setups. Pitney Bowes' Reynaga, who said he anticipates the imminent arrival of V.Fast modems, plans to use the 28.8-Kbps modems primarily for file transfers. "Why should I pay for switched 56-Kbps lines when I can get this?"

Hughes' Goldenberg uses dial-up lines to support teams of proposal writers headquartered temporarily in locations around the world. For them, the cost of using dial-up services is lower than the equipment and setup costs required with higher-speed leased lines. "We have subcontractors in France and proposal teams on the road in Australia doing dial up with AppleTalk Remote Access and [PhoneNET] Liaison by Farallon Computing, which is very similar to ARA," Goldenberg said.

Public lines, private lines. The faster-than-modems WAN services offered by various telephone companies can be divided into private lines on the one hand and public services on the other. Primarily private-line services, such as T1 and fractional T1, have become commodity items, although a recent free fall in T1 prices appears to have ended.

On the public networks, packet-switched services have become well-established (see story, Page 32). Circuit-switched 56-Kbps and T1 services are also available on the public networks, increasing the confusion of options.

Whether to use public or private networks depends on several factors, including the number of sites and the amount of traffic between them, their geographic distribution, and what application services will be provided.

While LAN topologies are determined largely by cabling systems, WAN topologies depend primarily on geography, and topology is a prime factor in choosing between public and private services. In general, public networking begins to look more attractive as the number of sites grows and the amount of traffic between any two of them decreases.

Private networks often make more sense when a few major sites can be connected together via a single backbone. "You want to use a linear topology or have a series of sites that generate the most traffic," Nolle said.

In practice, many managers use a combination of topologies. For example, Goldenberg said that although the Hughes network began as a simple backbone topology, it has moved closer to a star topology — in reality a backbone with stars hanging off of it — in an effort to reduce backbone traffic.

"It got to be so there was too much traffic over the central backbone," Goldenberg said. "Now we put traffic only on the sections it really needs to be on."

For users on public networks, the decision to transfer selected routes to private lines is mainly one of economics. "You have to concentrate your traffic to justify it," Nolle said. "If there is a fair amount of other traffic — Systems Network Architecture, voice, data-center connections — then you may be able to generate enough activity to justify private networking. Usually there will be routes where traffic is heaviest, and migration will come from privatizing those."

Distance plays a major role in any WAN topology. While you may have enough local traffic to justify a dedicated leased line, you may be better off trusting your transcontinental communications to the public network. "You have to separate your 'local' WAN and long-distance WAN needs," Langner said. "The long-distance carriers are using a whole different strategy than the Bell companies."

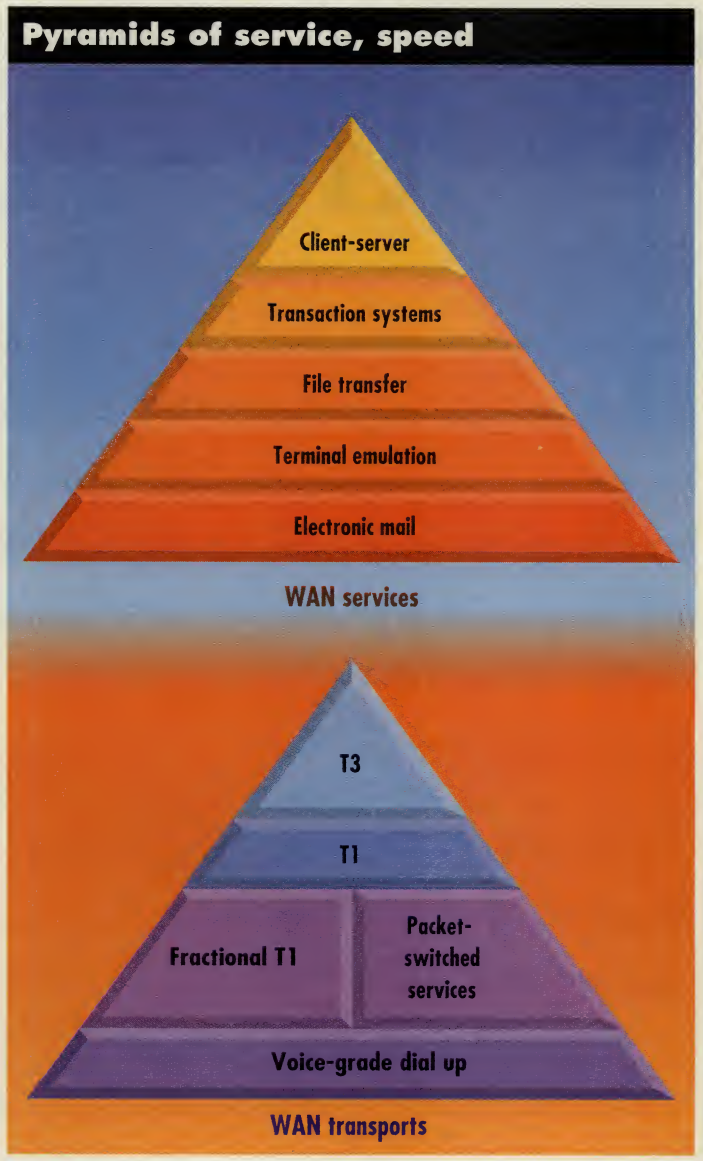
Long-distance companies have increasingly based their public offerings on frame-relay technology, while the RBOCs have pursued Switched Multimegabit Data Service.

"You need to determine your WAN needs specifically and then take it to the carriers," Langner said. "Each carrier will have a different answer, and they all have very different ways of pricing."

Any decision regarding private vs. public networks also should take into account security and reliability concerns. Hughes, for example, deals with classified military data that the company won't trust to public services. "The reason for private lines is security," Goldenberg said. "We don't encrypt our interconnections, but they are secure because the only way into them is on our site. We also find it is more reliable if we count on our own equipment and leased lines."

Thinking about tomorrow. Large-scale network management is an exercise in planning for the future. Managers must anticipate user requirements and new service offerings, while moving to the next level of service and trying to maintain a clear migration path.

In dynamically evolving WANs, retaining flexibility becomes a paramount concern. "Your network architecture should really insulate you from the chosen service protocols," Nolle said. In other words, managers should be able to change their transport services without affecting their applications. "If that is not happening, you haven't done your setup correctly." □



When 9,600 is not enough

By Clay Andres

Switching from analog to digital communications opens a plethora of WAN options.

The dial-in modem line may be the hacker's skeleton key for unlocking an organization's data vaults, but for most, the modem is a company's two-way link with the outside world of vendors, contractors, sales personnel and remote offices. Ever faster and less expensive modems have turned many local-area networks into constant or intermittent wide-area ones. This cost-efficient form of data communications allows a user to dial in to a file server, mail server or mainframe from virtually anywhere there is a telephone.

But as the volume of calls, connect charges or communications delays increases, companies that rely on analog connections for long-distance data exchange are struggling with their modems' speed and bandwidth. There is a range of available technologies, from faster modems to leased digital lines, that provide anywhere from two to 48 times the throughput of the fastest modems. The hard part is deciding when to cross over to a purely digital link.

Making the most of analog. "For a majority of applications, a dial-up strategy is most cost-effective," said Douglas Gold, director of communications research at International Data Corp. of Framingham, Mass. "The majority of traffic is still going at 9,600 [bps] or slower." Higher transmission speeds mean not only smaller long-distance charges but also improved productivity as people get information faster.

Most modem manufacturers have standardized on V.32bis, which allows transmission at a base rate of 14.4 Kbps and can push throughput to four times that with data compression. For applications that require

greater throughput, the top of the line is Mansfield, Mass.-based Motorola Codex's take on the proposed V.Fast standard; its modems race at a 28.8-Kbps base rate without compression.

Weatherwise. WSI Corp. of Billerica, Mass., uses Motorola's high-speed modems to provide weather data to subscribers, such as The Weather Channel, CNN, major airlines, local TV stations, utility companies and corporate aviation departments. WSI is set to release WeatherMac, a Macintosh software front end that allows individuals to dial up its data directly or through public data networks, such as Telnet and Tymnet.

Depending on the volume of data that a company requires and WSI's estimate of connect time, the company recommends either leased lines or dial-up service for its corporate customers. Most are able to use dial-up connections with high-speed modems. Motorola's 28.8-Kbps modems have allowed WSI to lower costs for analog service, according to Norm Gentry, WSI communications manager. The modems also provide an essential fallback for the leased lines.

The fastest dial-up communications come with ISDN (Integrated Services Digital Network). Using almost-standard telephone lines, ISDN transmits data at 64 Kbps or more (see story, Page 36).

For some users, such as Duane Sincerbox, principal of Palo Alto Linotext Inc., a pre-press service bureau in Palo Alto, Calif., installing ISDN is a cheaper alternative and a more savvy investment than leasing digital lines.

"Once ISDN gets going, all the money you spent on switched 56 [-Kbps lines] will just go down the tubes," Sincerbox said.

The modemless WAN. For most, however, the standard in digital phone lines is a single-channel switched 56-Kbps line or the industrial-strength 1.54-Mbps T1, which offers 24 data channels (while each T1 channel is defined as having 64-Kbps throughput, the actual rate in most U.S. implementations is 56 Kbps). Instead of converting digital information into analog signals with modems, the purely digital services require a channel service unit/data service unit device to connect the digital telephone line (channel) to the local digital network (data).

Most telephone companies provide digital connections through public packet-switching networks or dedicated leased lines. Leased lines are private, reserved for your organization's exclusive use 24 hours a day, and charges are determined by the length of the line. Switched services, on the other hand, use standard, public telephone lines that have been guaranteed by the phone company to carry clean digital signals. You use them just as you would analog lines: by dialing the phone number of another computer. You pay a monthly service fee for each plus long-distance charges.

Organizations have found that speed and throughput are not the same, which often leads them to multiplexed T1 options.

Going the distance. Unlike dedicated lines, which provide static point-to-point service, switched connections give you access to multiple locations, whenever you want. Since the monthly fee is based on the distance from your office to the local telephone office, such lines usually cost less. But if your application requires constant access to a single site, or the number of calls you are making — and your resulting long-distance bill — is large, dedicated lines may prove more economical. In either case, both types of service are available in 56-Kbps increments up to at least T1 speeds.

The network at Connecticut College in New London, would turn most corporate Mac managers green with envy. A fiber-optic backbone supports slower LAN links to every building, classroom, office and dormitory, providing a full range of communications services to the entire campus. The campus enjoys a 9-1 ratio of Macs to IBM PCs and compatibles, with LocalTalk connected to Ethernet via Cayman Systems Inc.'s GatorBox routers.

The entire network is connected to the Internet over a 56-Kbps line through the University of Connecticut in Storrs. Another 56-Kbps line connects the libraries of Connecticut College with Trinity College in Hartford, Conn., and Wesleyan University in Middletown, Conn. By upgrading its links to dedicated 56-Kbps lines, Connecticut College acquired the bandwidth necessary to give every student an Internet account, saving the small liberal-arts college the expense of expanding its LAN-based electronic-mail services.

Room to pass. Speed is not the only issue when it comes to building a WAN. High volumes of network traffic can stall a single-channel 56-Kbps line in gridlock. Organizations have discovered that speed and throughput are not the same, a truism that often leads them to multiplexed T1 options.

"Our original move to switched 56 made a huge difference in terms of having enough space for mail and news traffic," said Gage Paulsen, chief operating officer at Herndon, Va.-based InterCon Systems Corp., a developer of TCP/IP products for the Mac. "To keep charges down, we called late at night and would batch all our requests together. It was easy to end up with a 24-hour latency in mail."

As InterCon's business increased, so did its mail, and the company now averages 200 to 300 Kbytes of mail per person per day, Paulsen said. Latency became such an issue that it is now spending $12,000 a year — $400 a month more than the 56-Kbps link cost the company — to lease a T1 line to its Internet service provider 30 miles away in Washington, D.C.

"We had special research needs that required us to be logically close to other developers," Paulsen said. "Now we get 10-minute response time, which is like talking to someone on the telephone."

The California Department of Transportation built a network connecting all 14 of its offices with switched-56 links. Numerous applications and computers use the network, which runs AppleTalk, DECnet and TCP/IP protocols. The largest Macintosh application allows access to the specifications database for highway bids.

"Everything works very well," said Stephen Whitington, Caltrans network manager in Sacramento. "But the network has continued to grow as more applications have been put on, and we've evolved into [dedicated] T1." The first T1 link runs from Sacramento to Los Angeles, and others will be added as needed.

"The fact is, when you hit the Enter key [to send E-mail or enter a transaction], it seems to go a whole lot faster, but the speed [of T1 and switched 56] is the same," Whitington said. Having the bandwidth to push more bits down Caltrans' data highway makes everything work faster and has given the department plenty of passing room for future applications.

Go configure. Justifying the switch to a digital link should be a relatively straightforward process. Compare the cost of your current dial-up service with the costs for digital services. (This process is made somewhat more complicated by the numerous options available and the number of competing telephone companies offering service.)

Any dial-up connections involving a LAN require more than just modems. The cost of additional hardware and software may be significant. But by and large, your application is going to force the issue. Those that typically require the increased speed and throughput of purely digital communications include frequent lengthy file transfers, especially of graphics files; large volumes of electronic mail where response latency is an issue; time-sensitive information, such as continual database access; and any mission-critical activity that can't be kept waiting.

Once you've made the switch to digital, however, life gets easier in one respect: Upgrading to T1 or fractional T1 is mostly a matter of adding a multiplexer and paying the bill. And similar upgrades open the door to the advanced packet-switching technologies: frame relay, Switched Multimegabit Data Service and, eventually, Asynchronous Transfer Mode. □

MODEMS

Speed: V.32bis without compression, 14.4 Kbps; V.Fast, 28.8 Kbps
Availability: V.32bis, now; V.Fast, end of year from several vendors
Providers: V.32bis, virtually every modem maker in the world; V.Fast, Motorola Codex now proprietary and more than 60 others later

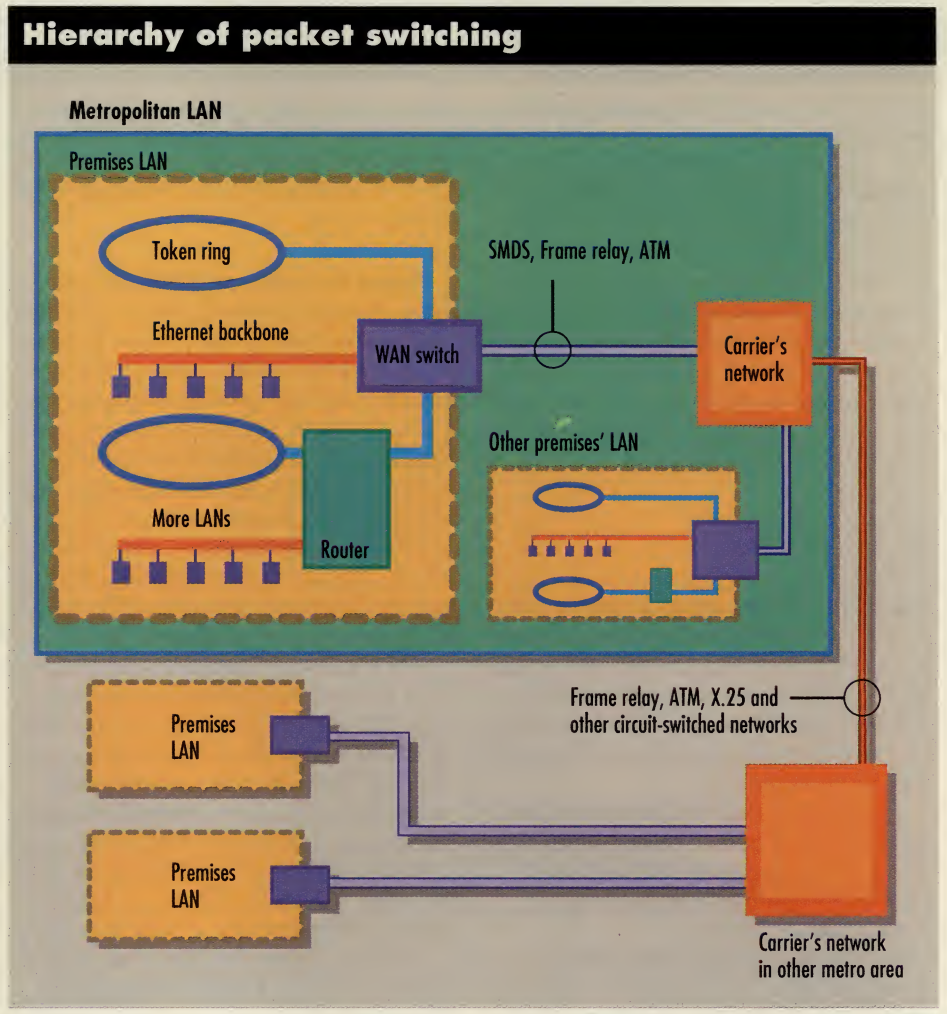
WANs don't suffer from too few choices

WAN TECHNOLOGY	BANDWIDTH
V.32bis modems	14.4 Kbps
V.Fast modems	28.8 Kbps
Switched 56	56 Kbps
Integrated Services Digital Network (ISDN)	64 Kbps to 1.54 Mbps
Fractional T1 & T1	64 Kbps to 1.54 Kbps
Frame relay	9.6 Kbps to 2.0 Mbps
Switched Multimegabit Data Service (SMDS)	1.4 Mbps to 45 Mbps
T3	1.4 Mbps to 45 Mbps
Asynchronous Transfer Mode (ATM)	45 Mbps to 1.2 Gbps

Everything's coming up packets

Public switched systems are becoming the leading edge in wide-area networks.

By Bruce Schneier



NEVIN BERGER

For many years, the only way for distant computers to communicate over the public telephone system was via a voice-quality link, either a dial-up line or a point-to-point leased line. Big companies needed better connections, and several data communications standards, such as X.25, were developed to provide them on these lines. As networks expanded and applications required speedier transmission rates, time-division multiplexing (TDM) technologies stepped in to provide cheaper and faster data transfers on large-bandwidth circuits, often making it cheaper to lease a dedicated T1 line than to run several low-speed lines.

Packet trio. In recent years, increased transmission rates, more-intelligent network equipment and cleaner transmission lines have spurred the growth of packet-switching technologies. Unlike TDM networks, which give each user a data pipeline regardless of whether it is needed or used, packet-switching technologies make much

Switching to multimegabits: SMDS on the rise in metropolitan areas

Switched Multimegabit Data Service provides wide-area communications through the public telephone network. Instead of requiring numerous dedicated private lines among network users, each SMDS site requires only one connection to reach everyone else on the SMDS network. The economic advantages of this approach are considerable if you have to connect many different sites.

SMDS' flexibility enables organizations to meet short-term networking needs quickly and efficiently, sometimes allowing them to connect remote sites that wouldn't otherwise justify the expense of dedicated links. And because it is available from public carriers, SMDS generally is a cost-effective option for smaller organizations with high-volume data communications needs that are unable to afford a dedicated private network.

SMDS is well-suited for applications with frequent but short transmissions, such as electronic mail or limited database access. SMDS is especially useful in organizations where it is not possible to predict which parties will need to be connected at what times.

SMDS channel service units/data service units (CSUs/DSUs) organize outgoing data from variable-length LAN packets into fixed-size units called cells. Each cell contains source and destination addresses and can be routed by the SMDS switch along one or more paths.

With SMDS as a public network service, organizations can create their own virtual networks. Addresses can be screened so that only authorized destinations can receive data and so only authorized sources can send data to a particular recipient. Broadcasting data to multiple recipients at once is also possible.

SWITCHED MULTIMEGABIT DATA SERVICE (SMDS)

Speeds: 1.4 Mbps to 45 Mbps
Availability: Now
Providers: All ROBCs and long-distance carriers

Operating at five speeds between 1.4 Mbps and 45 Mbps, SMDS offers reasonable WAN speeds with reduced cost and administration work compared with leased lines. SMDS uses fewer access circuits, and like regular switched services, the expense is divided into access and usage costs. For many organizations, usage-based billing means big savings over dedicated lines.

Because it uses the same addressing scheme as the telephone — phone numbers — SMDS also makes global long-distance communications easier than alternatives.

All the regional Bell operating companies and major long-distance carriers support SMDS. To replace an existing leased-line network with SMDS involves ordering SMDS service from your carrier and installing a T1 or T3 SMDS access line to the local carrier, an SMDS upgrade for your LAN router or other data-terminal equipment, and an SMDS-capable DSU for each site.
— By Bruce Schneier

ILLUSTRATIONS BY SCOTT BALDWIN

Passing the torch to frame relay, the WAN voted most likely to succeed

Frame relay's efficiency stems from its combination of the statistical multiplexing and port-sharing techniques of X.25 packet switching with the high speed and low delay of time-division multiplexing. Like the telephone system, a frame-relay network establishes a direct link between the sender and recipient for the length of the transmission.

Frame-relay networks use variable-length data packets, transmitting at speeds as low as 9.6 Kbps and as high as 2 Mbps; typical speed is 64 Kbps. Each organization negotiates a committed information rate (CIR) at setup time, representing a pricing compromise between the customer's estimate of its peak traffic during a busy period and the rate that the telephone carrier can guarantee to deliver. By using both multiplexing and packet methods that have very low network delay, frame-relay traffic can often share circuits with voice traffic, making it almost ideal for long-distance on-line transaction processing.

Permanent virtual circuits. Each frame-relay packet carries a circuit number that identifies its source and destination addresses. In private networks, the library of addresses making up the connection list is administered by the network manager. With a public frame-relay service, this management is handled by the carrier. Although frame relay's simplified network design reduces hardware requirements and operating costs, large frame-relay networks require careful management, with connections being redefined for everyone in the network whenever sites are added or changed.

Each frame-relay site requires only one connection to the carrier's packet network. In current frame-relay implementations, the connections are permanent virtual circuits (PVCs), which means that only the end points of the connection are defined by the user. The actual path taken by the data as it moves through the carrier's network is determined dynamically. In the event of congestion or line failure, the carrier's network automatically reroutes network traffic along the best available alternate path.

Although higher speeds are planned, frame relay currently is suited for applications that need bandwidth in the T1 range — 1.5 Mbps and less — in organizations requiring data communications only to specific locations.

"Frame relay is useful if you have a limited, unchanging set of users," said George Shenoda, director of technology at Kentrox Industries Inc., a data-communications company in Portland, Ore. "For example, a bank with a predetermined number of automated-teller machine stations uses frame relay nicely."

FRAME RELAY
Speeds: 9.6 Kbps to 2 Mbps (negotiable)
Availability: Now
Providers: AT&T, Sprint, MCI and other carriers

Distributed applications, such as databases with large and frequent transactions, are also good choices for frame relay.

Frame relay can be implemented on customer-premises private networks via dedicated T1 circuits, or through interfaces to public carriers. AT&T Co., MCI Communications Inc., Sprint Corp. and other interexchange carriers all provide frame-relay services. To date, local telephone companies provide only fixed-rate access from a customer premise to an interexchange carrier, but many of the regional Bell operating companies have announced plans to provide local frame-relay service.

Easy upgrades. Because it's a simplified protocol based on X.25, frame relay runs on most X.25 equipment and networks. Existing multiplexing equipment can usually be upgraded to frame relay. Installing frame relay on a private network of T1 circuits may be as simple as adding a software upgrade to your LAN router.

Since many existing channel service units/data service units (CSUs/DSUs) are compatible with frame-relay technology, you can use your existing T1 line or backbone to connect to a frame-relay switch or network multiplexer. It will probably not be necessary to upgrade the CSU/DSU for your T1 line. For organizations with a high demand for remote LAN-to-LAN connectivity, adding frame relay to their existing private circuits and packet switches may prove to be cost-effective. Most savings come with long-distance data communications.

Connecting frame relay to a public carrier requires the addition of frame-relay software to your LAN routers (many high-end router companies offer this upgrade), a frame-relay interface, and an access line between the carrier's equipment and your CSUs/DSUs. You must also configure a PVC for each site you want linked on your network.

Since frame-relay services have tariffs, you pay for only the bandwidth you use. Normally, this would be a much more efficient use of bandwidth than dedicated leased lines, except that the way in which phone companies have structured frame relay is "complex, confusing and not designed to attract users with modest requirements," said Jim Lane, president of TRAC Associates, a communications and network consultancy in Sagamore, Mass.

"It is often more cost-effective to buy an entire T1 line," he said.

The signs are that this situation is changing as carriers try to attract more savvy users to frame relay, but watch out. — By Bruce Schneier

For many applications frame relay will remain the best data-transmission choice for years to come.

more efficient use of communications channels by giving users access to an entire communications channel when they need it, for only as long as they need it.

Three packet-switching standards — frame relay, Switched Multimegabit Data Service (SMDS) and Asynchronous Transfer Mode (ATM) — have emerged to provide high-bandwidth communications while taking advantage of the economies of on-demand packet networks.

The same, only different. Each of the three standards divides the local data stream into packets, which contain chunks of data, before sending it over the wide-area network. The packet acts as a data envelope, specifying a recipient and a return address. Most similarities among the three types of packet-switching networks end there.

Strictly speaking, frame relay and SMDS are not technologies but services that you buy from your local telephone company (see stories, this page and previous page). The two services are based on different underlying technologies and suit different needs. Frame relay is based on fast packet-switching technology and ISDN (Integrated Services Digital Network) protocols, and it is best suited for distributed applications running among a relatively few fixed sites. SMDS is based on IEEE 802.6 metropolitan-area network technology and is geared toward more-flexible networks, where many different sites must be connected at different times.

ATM, on the other hand, is an emerging technology whose primary benefit is carrying time-sensitive data, such as video or sound, without interruption. ATM has attracted a lot of attention because it is intended for both WANs and LANs. Future Broadband-ISDN (B-ISDN) services will be based on ATM. B-ISDN is a fiber-optic public network service that will accommodate voice, data and video at once.

The three standards are different in other respects as well. Frame relay uses variable-length packets called, appropriately enough, frames. SMDS and ATM use short, fixed-length packets called cells. SMDS is "connectionless": Like correspondence sent through the mail, each cell of data can take a different path to the recipient. Frame relay and ATM are "connection-oriented": The network creates a fixed path between two endpoints for the duration of the communication, like a voice telephone call.

Compatibility, obsolescence not problems. These WAN technologies work with AppleTalk networks, assuming the presence of an intelligent WAN router.

See Packets, next page

ATM ready and waiting in the wings — for both WAN and LAN operations

Asynchronous Transfer Mode has been touted as the ultimate end-to-end public network. The technology promises to tear down the walls between local-area and wide-area networking.

By creating a universal transfer method for all applications, ATM could make data networks as ubiquitous and transparent as the voice network is today. Although widespread end-to-end ATM networking is at least a decade away, equipment manufacturers and telephone companies are starting to put the required infrastructure into place.

Like Switched Multimegabit Data Service, ATM uses 53-byte fixed-length packets, called cells. The cell size is a compromise between the long frames generated by data-communications applications and the short, repetitive sizes required by voice communications. This size also helps make ATM suitable for transporting digital video. Indeed, ATM's biggest draw is that it is "isochronous," meaning it can make consistent bandwidth available to time-sensitive applications, such as digital video playback. Isochronous ATM networks may make possible the mixing of data, voice and video within the same pipeline without concern for compatibility across LANs and WANs.

It's got scalability. Because ATM is scalable, many different systems, such as LANs, switches and public networks, can use the ATM packet format. Previously, networking standards usually tied data rates and formats into one package that was incompatible with other protocols. With ATM, a cell generated by a 100-Mbps LAN can be carried over a T3 line to a central office and switched to a 2.4-Gbps optical transport. This scalability will support high capacities when ATM is implemented and allow for virtually unlimited bandwidth expansion in the future.

ATM's scalability means that applications can use the network at rates and degrees of burstiness compatible with the application, not at rates convenient to the network.

ASYNCHRONOUS TRANSFER MODE (ATM)
Speeds: 45 Mbps to 1.2 Gbps
Availability: 1994 (limited)
Providers: AT&T and Sprint (announced), MCI (expected)

"Unlike a shared network, such as Ethernet, where your performance is determined by the usage of everyone else on the network, with ATM you get what you need," said Mark Juliano, manager of product marketing for Fore Systems Inc., an ATM hardware manufacturer in Pittsburgh.

The uniform cell format used by ATM LANs and WANs will greatly simplify interconnecting the two. "ATM works just as well in a LAN as a WAN," said Jim Lane, president of TRAC Associates, a consultancy in Sagamore, Mass.

Future perfect? Still an unproven technology, ATM's standards have not all been defined. It is not anticipated to become widely available until the late 1990s, but for some people ATM is already here. A number of vendors — notably Fore Systems and Adaptive Corp., a network products supplier in Redwood City, Calif. — have already developed ATM switches and adapter cards for minicomputers. And although it's still too early for a product announcement, Fore Systems is "actively discussing with Apple the possibility of a NuBus ATM adapter," Juliano said.

AT&T Co. and Sprint Corp. have announced ATM service to start in early 1994, and MCI Communications Inc. is expected to follow soon after. Local carriers are also planning ATM support; NYNEX and Bell Atlantic are starting limited services in large metropolitan areas, with widespread service beginning in 1994.

"Initially, big companies with power users will benefit," Lane said. "Eventually, prices will crash and costs will be comparable to Ethernet. This is the LAN and WAN technology for the late '90s and beyond. It's not perfect, but it's got more going for it than anything else anyone has come up with." — By Bruce Schneier

ATM has attracted a lot of attention because it is a technology intended for both WANs and LANs.

Packets

From previous page

The router encapsulates relatively high-level networking protocols in a packet network's low-level link protocol. With properly configured routers, AppleTalk networks sending data over packet-based WANS should experience no compatibility problems.

"Frame relay, SMDS and ATM don't care what the LAN protocol looks like; it's just a bunch of packets to them," said Dean Gahlon, systems programmer at Network Systems of Minneapolis.

Frame relay and SMDS services are available and expanding, and ATM is approaching fast, but network designers who want the largest bandwidth and best performance for the least amount of money can choose between the two current offerings without fear of buying into obsolete equipment.

"Carriers will install switches that can support SMDS, frame relay and native ATM interfaces," said Charles Gallucci, product manager at Netrix Corp., a network product manufacturer in Herndon, Va.

In fact, some equipment vendors are covering all their bets: designing ATM switches that can accommodate input and output in X.25, frame relay and SMDS.

As with any technology, waiting for the perfect solution to come along can be self-defeating.

"If you need networking, get what's available," said Jim Lane, president of TRAC Associates, a networking-consulting company in Sagamore, Mass. "It's going to be a while before ATM is common. Frame relay and SMDS are available now."

While observers say the regional Bell operating companies had been pushing SMDS at the expense of frame relay, now the companies are offering both.

"A year ago they changed their tune," Gallucci said. "They found that some customers weren't ready for SMDS."

SMDS' access speeds are bound to increase in the coming years as it migrates to the Synchronous Optical Network (Sonet) standard, which supports speeds in excess of 155 Mbps. Because of this and other technical similarities, many expect SMDS will migrate gracefully to ATM when the latter is available more widely. Most of the SMDS data service units being built today should be upgradable to ATM.

The app's the thing. A typical technology rule of thumb applies well to the new breed of packet-switched WANs: Let your application be your guide.

Brian Fairness, network analyst at the University of Oklahoma in Oklahoma City, chose frame relay for the Oklahoma Medical Imaging Network, which uses Macintosh computers to transfer imaging data among rural hospitals.

"We have dedicated T1 lines running frame relay. When we start doing interactive video, we'll have to switch to ATM," he said.

Dave Stacey, president of Schism, a multimedia company in Los Gatos, Calif., is holding out. "ATM offers superior capability to transmit video and image traffic. Apple is trying to build more and more capabilities for multimedia, and that will translate to networking needs that require ATM."

For many applications, frame relay will remain the best data-transmission choice for years to come. Frame relay's current limitations in circuit allocation should be eliminated as the technology continues to evolve. Switched virtual circuits, which allow users to set up connections only when they are needed, will largely supplant the permanent virtual circuits in use today.

Gripes about Frame relay's speed limitations will likely disappear as transmission rates higher than T1 become cheaper and more available.

Even if ATM provides an all-encompassing voice and data-communications technology, organizations can continue to use frame relay where appropriate.

"Frame relay will continue to be the low-cost option that will become the front end for ATM," said Paul Callahan, senior analyst for network strategies at Forrester Research of Cambridge, Mass. □

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Gateways From The Workgroup To The World.

ISDN: In search of infrastructure

By John Stephens

Apple jumped on the ISDN bandwagon, but the data vehicle didn't go anywhere.

In the tangle of protocols and standards that make up today's telecommunications jungle, it's hard to pick the strongest vine upon which to swing. You may wind up grabbing only enough rope to hang yourself.

Take the case of ISDN (Integrated Services Digital Network) and Apple. ISDN took an early lead among contenders for the higher-bandwidth telecommunications standards of the 1980s. But all that changed with the advent of services such as frame relay and Switched Multimegabit Data Service. It changed so much that what looked like a cakewalk for ISDN proponents has turned into something of a rout.

Last one in is ... Apple was one of those proponents. In 1991, it introduced its ISDN NB Card. ISDN, Apple's marketers assured developers, was the on-ramp to the coming "information superhighway."

And why not? Running over cheap copper telephone wires, ISDN offers two channels of 64 Kbps for voice or data and one 16-Kbps control channel, for a total throughput that is 10 times that of a 14.4-Kbps modem. And that was to be just the beginning, as fiber-based Broadband ISDN (B-ISDN) would catapult applications into the throughput stratosphere.

Apple evangelized ISDN, hoping that some developer would come up with the spreadsheet of ISDN applications based on its card. But Caller ID wasn't exactly a killer application. Meanwhile the market bogged down in a plethora of incompatible versions of the ISDN "standard," and computer-based uses received less-than-overwhelming support from the phone companies. As a result, ISDN was available some places and not others; it was no way to run a wide-area network.

Good intentions. For now, ISDN is not so much a technology in search of a solution as a protocol looking for an infrastructure.

"When we started this [ISDN NB Card project], we looked at it as a prototype," said Russell Winsper, manager of wide-area communications at Apple. "The intent was to position the technology and hopefully provoke the ISDN marketplace. In retrospect, we probably were too early, which is why the project suffered the way it did."

According to Winsper, as soon as its ISDN NB Card was on the docket, Apple began looking for a third-party partner on which to offload it, one that would take over the card's care and feeding and nurture it to broadband fruition. In anticipation of one imminent deal, Apple yanked the card from its inventory list. When the deal fell through, the company was obliged to resurrect support for the card, which it continued to sell mostly in "onesie twosies, as tests really," Winsper said. Now that third-party companies such as Paris-based Euronis have picked up the ball with their own Mac-compatible ISDN cards, Apple has no plans to stay in the ISDN hardware business. "It is doubtful we will continue development on our own card," Winsper said.

While ISDN is on the fast track in Europe and Japan, thanks largely to government intervention, developers in the United States are frustrated by the lack of infrastructure, according to David Sauerhaft, project manager for multimedia and personal video at Compression Labs Inc. of San Jose, Calif., which sells the Cameo Personal Video System, an ISDN-based videoconferencing package. "I would not minimize the efforts and difficulties a customer goes through in the process of procuring ISDN service," Sauerhaft said.

Live from Livermore. CLI is one of ISDN's success stories. At Lawrence Livermore (Calif.) National Laboratory, for example, researchers are showcasing a CLI-based videoconferencing proposal they call Personal Telepresence.

Mike Pihlman, a telecommunications system engineer at the lab, and his partner, Renee Farrell, are working with Compression Labs to harness ISDN and the Cameo system for education and business purposes. Pihlman said he hopes to eventually see videoconferencing used throughout the city of Livermore.

"We have two Cameo systems installed here, and we are doing testing, showing [the rest of the lab] how it works," Pihlman said. He has used the system to make conference calls all over the United States. "The world and the educational system really need this type of technology," Pihlman said. "Imagine a city where, instead of going to work, you can stay at home but still go to meetings. Or virtual classrooms where interactive learning can take place."

Pihlman, who previously worked at Bell Labs, remains confident that ISDN will become a global standard despite its troubles. "I believe ISDN will replace analog phone lines, and the higher-bandwidth standards like B-ISDN will take off from there," Pihlman said.

With more than 10,000 ISDN-capable phone lines running into the labs, Pihlman is able to conceive of such possibilities only because his local phone company supports ISDN.

ISDN's travails may be drawing to an end, however, as five of the seven regional Bell operating companies (RBOCs) embrace the ISDN-1 standard, which was rolled out with much fanfare last November. The standard will allow the many incompatible versions of ISDN to interoperate, so that, for example, Northern Telecom Inc.'s equipment can talk to AT&T Co.'s. The RBOCs predict that by 1994, at least 50 percent of the phone lines in the United States will be ISDN-capable. In addition, specialized adapters should be able to handle any remaining incompatibilities, said Dave Osterhoudt, regional sales manager at Engage Communication Inc., an Aptos, Calif., manufacturer of ISDN-capable AppleTalk routers.

And with Primary Rate Interface (23 64-Kbps ISDN channels) now available, ISDN is capable in some areas of T1-level throughput. Many are still convinced that ISDN will be the entree to the nationwide digital infrastructure conceived of by Vice President Al Gore.

With every cloud a silver lining. One positive result of Apple's ISDN experience has been the development of its Telephone Manager architecture. The Telephone Manager is an extension to the Macintosh Communications Toolbox that provides "telephone-aware" applications with a standard means of connecting to telephone hardware.

The Telephone Manager was developed to support the ISDN card, but because it is protocol- and hardware-independent, developers can easily create drivers for other telephonic standards, such as switched 56-Kbps lines, normal phone lines and specific PBXes.

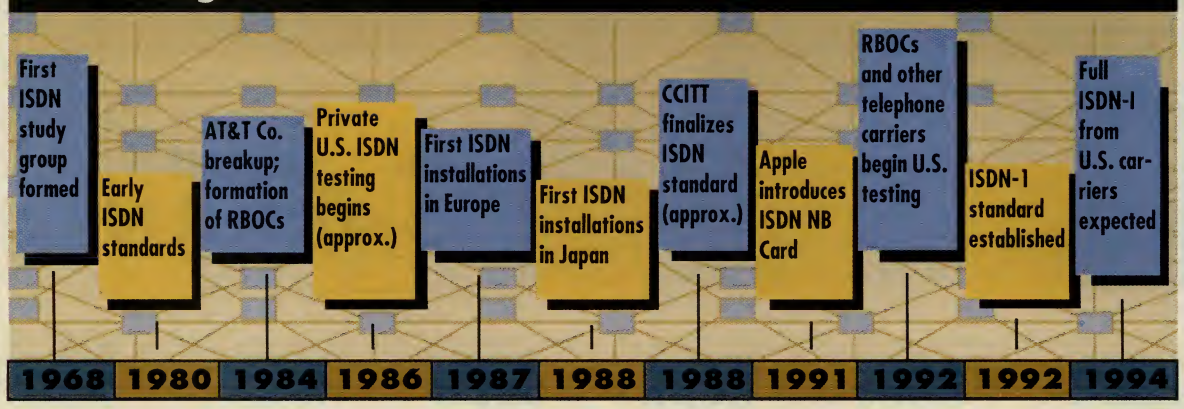
"The win was in the Telephone Manager, which allowed us to put all the software infrastructure in place," Winsper said.

Regardless of the fortunes of ISDN, the Telephone Manager has positioned the Macintosh to become the user's dashboard into whatever is offered on the other side of the wall jack. □

INTEGRATED SERVICES DIGITAL NETWORK (ISDN)

Speed: Basic Rate, 64 Kbps; Primary Rate, 1.54 Mbps (total)
Availability: Basic Rate, now; Primary Rate, varies by carrier and area
Providers: All RBOCs (Southwestern Bell and US West do not adhere to ISDN-1 standard)

ISDN's long road home



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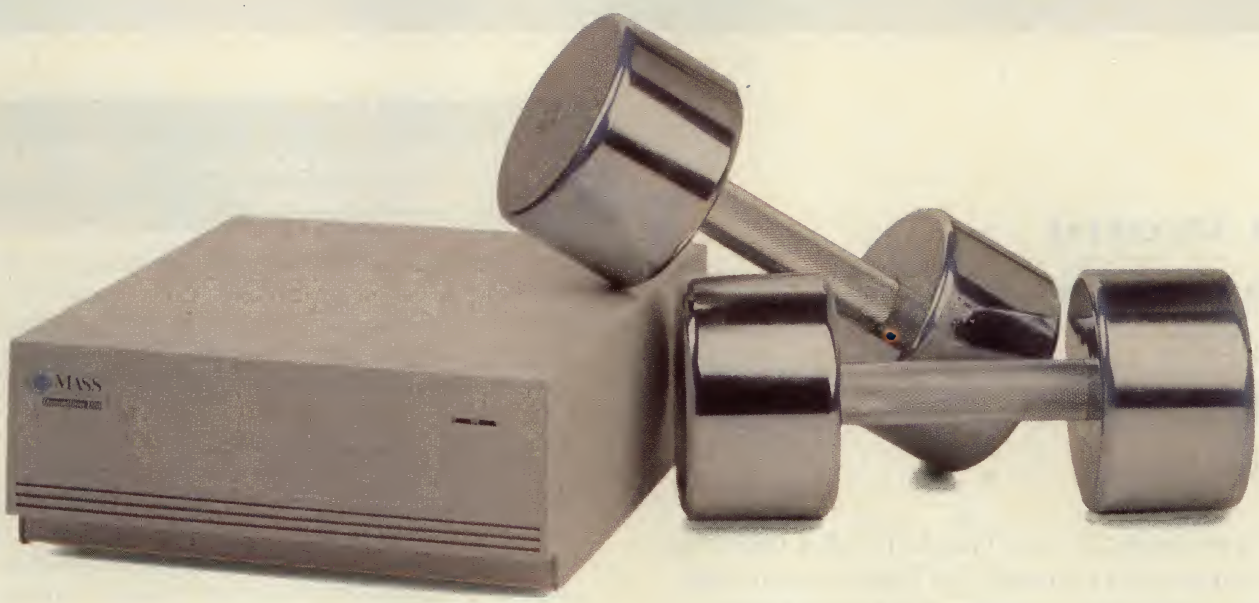

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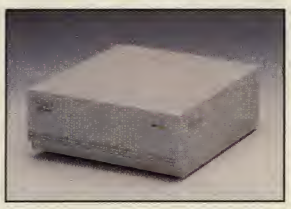

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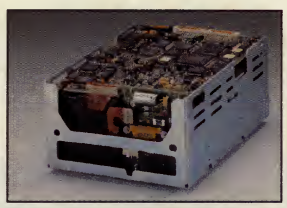

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DeltaPoint assembles Graphics Tools!

App edits, converts and catalogs images

DeltaPoint's forthcoming Graphics Tools! for the Mac gives users thumbnail views of image files. Users can search for images by file name or keyword.

By Lisa Picarille

Monterey, Calif. — DeltaPoint Inc. is readying a package of utilities designed to simplify the process of manipulating and organizing graphics and video and converting them between formats and platforms.

Graphics Tools! for the Mac, slated to ship in July for $169.95, comprises two modules.

▸ **Media Manager** organizes video clips, sounds, graphics and photos into thumbnail views. Users will be able to select documents by searching on the file name or user-defined keywords. Thumbnails can be viewed, scaled, resized and printed. Users will also be able to create "collections," or sets of images, that can be named and saved in a group.

Media Manager provides file-conversion facilities, supporting formats such as PICT, Encapsulated PostScript, CGM (Computer Graphics Metafile) and WMF (Windows Metafile). The program will let users convert files in the background, as well as perform batch-file conversion.

▸ **The Image Processor** will let users create logos, designs and illustrations. The module also provides a set of sophisticated tools for manipulating and retouching images and making color separations.

Graphics Tools! will ship with a CD-ROM containing 700 pieces of clip art and 150 photo images. The CD-ROM also includes images that can be played in Eastman Kodak Co.'s Photo CD format.

DeltaPoint next month will ship a Windows version of the software, also priced at $169.95. The company said the Mac and Windows versions are almost functionally identical, although Graphics Tools! for Windows will include an auto-trace facility not in the initial Mac release.

DeltaPoint Inc. is at 2 Harris Court, Suite B-1, Monterey, Calif. 94940. Phone (408) 648-4000 or (800) 367-4334; fax (408) 648-4020. □

Full-bleed tab-size model joins LaserMaster Unity printer line

By Matthew Rothenberg

Eden Prairie, Minn. — LaserMaster Corp. this month rolled out two new versions of its 1,200-dpi Unity laser printer, including a model that handles full-bleed tabloid-size output.

The Unity 1200XL-O Plain Paper Typesetter and Unity 1200XL-T Plain Paper Typesetter are available for $9,995 and $6,995, respectively.

▸ **The 1200XL-O** has a maximum print area of 11.69 by 19 inches and handles pages measuring as large as 12 by 19.5 inches. It comes with simultaneously active Ethernet, LocalTalk, Centronics parallel and RS-232C serial interfaces; 32 Mbytes of RAM, which can be expanded to 48 Mbytes; an 80-Mbyte internal hard disk; and 235 Type 1 fonts.

▸ **The 1200XL-T** prints to pages measuring up to 11 by 17 inches, although it lacks the full-bleed capabilities of the 1200XL-O. Ethernet is available as a $995 option. The printer comes with 21 Mbytes of RAM, which can be expanded to 48 Mbytes; a 40-Mbyte internal hard disk; and 135 Type 1 fonts.

Both Unity models print letter- or legal-size pages at a rate of 8 pages per minute and tabloid-size pages at 4 ppm. Each printer includes automatic switching between LaserMaster's versions of Microsoft Corp.'s TrueImage PostScript interpreter and PCL-4.

The printers include a proprietary 33-MHz RISC chip as well as an FPU (floating-point unit) and 40 Kbytes of static-RAM cache memory. Both come with LaserMaster's TurboRes and TurboGray resolution- and gray-scale-enhancement software.

LaserMaster also cut the price of its original Unity 1200XL Personal Typesetter, which includes most features in 1200XL-T but has only a 20-Mbyte internal SCSI disk (see MacWEEK, Sept. 14, 1992). The printer is now $4,995, a $2,000 cut.

LaserMaster Corp. is at 6900 Shady Oak Road, Eden Prairie, Minn. 55344. Phone (612) 944-9457; fax (612) 943-3469. □

Olduvai's BrushFonts package offers users 10 brush-stroke fonts in both Type 1 and TrueType formats.

Linotype, Olduvai line up new font packs

By Kirsten L. Parkinson

San Francisco — Linotype-Hell Co. and Olduvai Corp. have released new font collections aimed at designers who want to put a new face on their documents.

▸ **Linotype-Hell** is offering its typeface library on CD-ROM for the first time.

The Just in Time disc contains the company's collection of 1,559 Type 1 fonts; 55 Linotype TrueType fonts; 841 Type 1 fonts from Elsner & Flake Design Studios of Dorfstarbe, Germany; and 1,100 Encapsulated PostScript images from C.A.R. Inc. of St. Louis.

The $99 disc comes with two unlocked fonts, Linotype's PMN Caecilia 76 bold italic and Elsner & Flake's Radiant EF text medium.

Through July 2, users can choose an additional four Linotype typefaces to unlock free. Prices to unlock additional fonts range from

See Fonts, Page 42

New Video raises EyeQ board for Premiere

By Neil McManus

Santa Monica, Calif. — New Video Corp. this month will release software that will let users of its EyeQ video-production boards edit movies in Adobe Premiere and output to videotape.

New Video's EyeQ NuBus boards use Intel Corp.'s I750B video processor and DVI (Digital Video Interactive) compression technology to let Macs display full-screen, full-motion video.

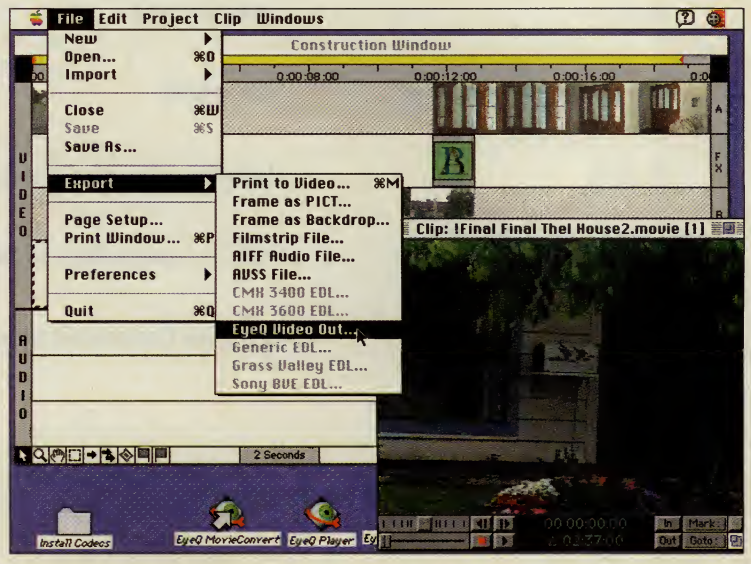
The new EyeQ 2.0 software ships with the company's $2,495 EyeQ 750/8 Playback Solution and $4,495 EyeQ 750/8 Authoring Solution. Both NuBus-based systems support 24-bit video with eight-bit Mac overlays on Mac monitors as large as 13 inches. The authoring system includes a daughterboard that lets users capture, compress and save full-motion video and 16-bit audio in real time.

EyeQ 2.0 lets the boards output video and audio to NTSC and PAL (European) video devices.

The new software also will let EyeQ users edit and output full-screen, full-motion movies from within Premiere 2.0, a $695 QuickTime editing program from Adobe Systems Inc. of Mountain View, Calif. According to New Video, the boards can now accelerate Premiere's Make Movie command by as much as 10 times. The company this summer will upgrade its EyeQ boards for compatibility with the Company of Science and Art's AfterEffects, DiVA Corp.'s VideoShop and VideoFusion's VideoFusion.

In addition, EyeQ 2.0 ships with

See New Video, Page 42



The EyeQ 2.0 software lets New Video's video-production boards accelerate Adobe Premiere and output video and audio to NTSC and PAL devices.

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New CD collections of stock images

By Ian G. Jacobs

San Francisco — Graphic designers hoping to find an easier solution to stock-image purchasing can look to three new CD-ROMs to make decisions in a snap.

▶ **Mirror Technologies Inc.** is selling a bundle of its CDR-10 CD-ROM drive with four discs containing more than 20,000 24-bit-color images compiled from four stock-photo agencies. The discs include a custom searching application written by 3M and QuickTime 1.5.

The $995 CD-Stock bundle includes thumbnails and low-resolution previews that can be exported as PICT or TIFF files.

The uncompressed thumbnails range from 88 by 58 pixels to 88 by 70 pixels, while the previews have resolutions from 500 by 333 pixels to 500 by 400 pixels and are PICTs compressed using QuickTime.

The four CD-ROMs can be purchased without the drive for $650.

▶ **Comstock Inc.** has released the first volume of its Encyclopedia of Stock Photography on CD-ROM.

The $149 Business and Industry disc contains 2,940 thumbnail images in 24-bit color. Each thumbnail is scanned at 72 dpi and is JPEG (Joint Photographic Experts Group)-compressed.

Full-size TIFF versions of the images can be purchased via Comstock's Digital Selection modem service or mail order. With the Digital Selection service, Comstock will scan the images at resolutions from 72 to 300 dpi and post them on its bulletin board within four business hours of an order. Prices for the full-size images range from $150 to $15,000.

▶ **Mediacom Inc.** is offering a two-disc set containing 210 royalty-free QuickTime movies for nonbroadcast use.

The 24-bit-color clips are compressed in Apple's Compact Video format, have a resolution of 320 by 240 pixels, and range from four to 41 seconds in length.

Some of the subjects of the $299 are wildlife and historical re-creations.

Mirror Technologies Inc. is at 2644 Patton Road, Roseville, Minn. 55113. Phone (612) 628-6295 or (800) 447-5392; fax (612) 633-3136.

Comstock Inc. is at The Comstock Building, 30 Irving Place, New York, N.Y. 10003. Phone (212) 353-8600; fax (212) 353-3383.

Mediacom Inc. is at P.O. Box 36173, Richmond, Va. 23235. Phone (804) 794-0700; fax (804) 794-0799. □

Fonts

From Page 40

$7 to $25, depending on the total number of fonts purchased.

The disc also ships with several Linotype utilities for browsing, installing and managing fonts.

An unlocked version of the CD that does not include the Elsner & Flake typefaces is available for $11,495 and comes with a free Apple CD drive.

▶ **Olduvai** is shipping BrushFonts, a $129 collection of 10 brush-stroke fonts in both Type 1 and TrueType formats. The package includes such typefaces as Bamboo, Kudasai and Zen.

Through June 30, BrushFonts is available directly from Olduvai for an introductory price of $79 plus shipping and handling.

Linotype-Hell Co. is at 425 Oser Ave., Hauppauge, N.Y. 11788. Phone (516) 434-2000 or (800) 842-9721; fax (516) 434-2748.

Olduvai Corp. is at 9200 S. Dadeland Blvd., Suite 725, Miami, Fla. 33156. Phone (305) 670-1112 or (800) 822-0772; fax (305) 670-1992. □

New Video

From Page 40

Intel's new Indeo video-compression software, which was developed by New Video and has been licensed by both Apple and Microsoft Corp. Indeo plays a 320-by-240-pixel QuickTime movie at 20 frames per second on a unaccelerated Quadra 950, New Video said. It offers complete file compatibility across the Mac and Windows platforms and compresses files more than 10 times faster than QuickTime's Compact Video compressor-decompressor (codec).

Apple will release Indeo as a separate codec this summer in the QuickTime Starter Kit. It will also appear in QuickTime for Windows 1.1 this summer.

New Video Corp. is at 1526 Cloverfield Blvd., Santa Monica, Calif. 90404. Phone (310) 449-7000; fax (310) 449-0132. □

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...the scan head, and color accuracy showed **the HP ScanJet IIc to be a top performer.** In addition to scanning at an optical resol...

The HP ScanJet IIc *uses a one-pass scanning method that makes it one of the fastest color scanners we've seen.* It also provides time-saving color previews that dynamically display any changes you make to the scan, such as exposure, hue, and saturation modification.

1992 Diamond Awards

For an all-around scanner offering high-quality color and black-and-white images, true 400-dpi resolution, and good basic scanning software, **HP's ScanJet IIc can't be beat.**

"We were extremely impressed..."

Hewlett-Packard's ScanJet IIp sets a new standard for affordable desktop gray-scale scanners. From its striking compact design to...

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We'd hate to brag. So we'll let the Mac press do it for us.

Macworld awarded both the HP ScanJet IIc and IIp their *World Class Award*, and named the HP ScanJet IIc as the *Best Color Scanner* for 1992, and the HP ScanJet IIp as the *Best Black & White/Gray-Scale Scanner*. While *MacWeek* gave their prestigious *Diamond Award* to the HP ScanJet IIc.

Speed. Simplicity. And accuracy were all applauded. It's no wonder. HP's single-pass scanning delivers both lightning-fast speed and precise color registration. TWAIN support allows scanning without having to switch between applications. And HP AccuPage technology with 400-dpi resolution can tackle the toughest OCR challenges. What's more, capabilities this advanced have never been this affordable. List price on the HP ScanJet IIc is just $1,599. The HP ScanJet IIp is just $879. And right now, the HP ScanJet IIc includes Adobe™ Photoshop LE.

Impressed? Don't just take our word for it, or even the Mac press's. Attend one of our scanning seminars that will be held April through September, 1993. To find out more about the HP ScanJet IIc and IIp or seminars in your area, call 1-800-SCANJET, Ext. 7364*. And judge for yourself.

HP ScanJet IIc

HP ScanJet IIp

HEWLETT PACKARD

News Analysis

Mac artists embrace tablets, yearn for improvements

Pen-based medium preferred by many illustrators, but there is still pressure for further refinements.

By Philip Bishop

In the field of digitizing tablets, Wacom Inc. of Vancouver, Wash., has been king of the hill for some time, managing to keep ahead of its two main competitors, Kurta Corp. of Phoenix and the Digitizer Products Group of CalComp Inc. of Scottsdale, Ariz. Wacom established this lead in part because it was first to offer pressure-sensitive tablets and cordless pens.

Although Wacom tablets are still considered superior by many, Wacom's lead is narrowing: Both Kurta and CalComp now offer pressure sensitivity and cordless pens at much lower prices. (Pressure sensitivity lets a user vary the weight of a line or the depth of a color by the amount of pressure put on the tablet.)

While the feature sets of all brands of tablets continue to mature, many artists still maintain wish lists for features that would make them more faithfully imitate traditional work styles.

King of the board. David Piña of Burbank, Calif., has long been an ardent fan of Wacom tablets. His company, Piña Design, has created animation and other artwork for the last three Academy Awards shows entirely on the desktop using Wacom tablets. Piña Design uses two of Wacom's new 6-by-8-inch ArtZ tablets and two of the company's 6-by-9-inch tablets.

Piña said that when he collaborated with Disney Studios on a job, he had no problems with equipment incompatibility. "When we went in there, they had Wacom tablets," he said. "These people are buying equipment that takes a lot of abuse and it's obviously reliable equipment or they wouldn't be using it." Piña said that Wacom tablets are "becoming a standard in the industry."

Price is right. Bob Aiese, a computer consultant to advertising agencies in New York at one time, used a Wacom tablet, but when he needed a larger model he switched to a CalComp Drawing Board II — not because he couldn't get the size he wanted from Wacom but because the Drawing Board was $500 cheaper. "I switched because I liked the price," he said. "And the quality is there." Aiese, also an illustrator, is currently directing the establishment of layout stations at Marke Communications in New York using a combination of QuarkXPress, Fractal Design Corp.'s Sketcher and CE Software Inc.'s QuicKeys together with CalComp Drawing Board IIs.

Skip Morrow of Wilmington, Vt., is equally content with his Kurta XGT/ADB. An illustrator who has become best-known as a cartoonist and author of "The Official I Hate Cats Book," Morrow said he often would overwork paper as he sketched a new generation of an illustration by hand. Now, with his digitizing tablet, he can edit to his heart's delight. "Once I have what I want, I print it out on acetate, put it in an overhead projector, blow it up to 30 inches by 40 inches and then hand-transfer that to illustration board."

Increasingly, clients are asking Morrow to combine hand-drawn images and photographs. He performs this work in Adobe Photoshop and employs the Kurta tablet's pressure-sensitive capabilities. "You need to feather the edges to make a seamless union of the two images," he said. "I've found that with the pressure sensitivity on the tablet, you can really control the amount of softening you apply to an edge."

Fellow Kurta XGT/ADB user, Bob McCarroll of McCarroll Advertising and Design of Phoenix, also uses pressure sensitivity for touching up photos in Photoshop. In fact, he said, "It's one of the main reasons we have it."

Pens preferred. All of the illustrators and graphic designers we spoke with preferred using a stylus for input rather than a puck.

See Tablets, Page 46

Chelsea Sammel used a CalComp Drawing Board II and Fractal's Painter to sketch this still life. She created the varying color densities using Painter's colored pencils, pastel chalks and water tools, in conjunction with the Drawing Board's pressure-sensitive pen.

SCREEN TEST

Re-typesetting a historic Talmud

Seeking to reproduce a rare version of the ancient Jewish body of laws and traditions known as the Talmud, a Rochester, N.Y.-based company modified Macintosh technology in an effort to re-typeset more than 30 volumes containing some 15,000 pages of Hebrew writings.

The historic Talmud of Vilna, Lithuania, first published more than 150 years ago, is studied by Jews around the world, but scholars have relied on crude copies of it ever since the Nazis destroyed the original printing presses. Until now, the technology wasn't available to re-typeset the complicated work with the exact layout of the earlier version.

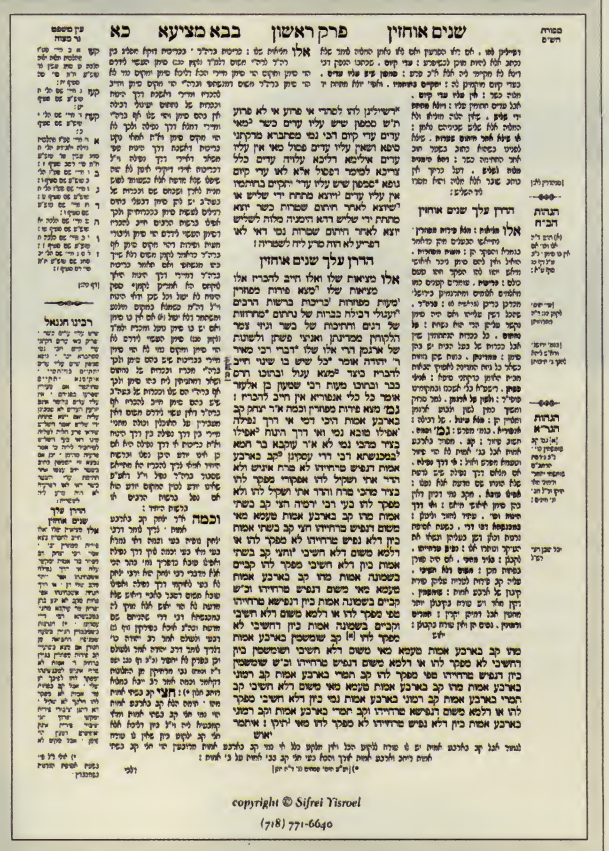
Font World Inc., which specializes in obscure fonts for languages such as Hebrew, designed 36 custom typefaces and proprietary software for the project. The company's font designers spent more than one year working with Apple engineers to refine a version of the Apple Hebrew operating system to include a more precise placement of accent marks and a broader range of characters produced using Fontographer from Altsys Corp.

Customized versions of the desktop publishing programs Design Studio formerly from Letraset and Ready, Set, Go! by Manhattan Graphics Inc. were used to lay out the text, which includes ongoing commentaries in columns on each page that must remain in sync with the main text.

Before embarking on the project, the company sought approval from rabbis and Jewish organizations, including some with a reputation for resisting modernization. "We were kind of apprehensive," said Israel Seldowitz, the company's founder. "But they said, 'If you're going to use technology in a positive way then go ahead.' "

The new edition of the Talmud will be published in stages over the next four years by Mendolsohn Press, a Font World spin-off. According to Seldowitz, much of the time will be spent on careful proofreading.

"We're talking about something that is going to go down in Jewish history," said Rabbi Aaron Mendolsohn, president of the Brooklyn, N.Y., publishing house. "This will be a standard in all Jewish universities and yeshivas." — By David Miller



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Case Study

Catalog artist goes digital — with a struggle

For Arlene Bender-Aiese, working with a digitizing tablet was not love at first sight. She has served as a free-lance art director and layout artist for dozens of mail-order fashion catalogs in her 20 years in the trade. But up until a year ago, wild horses couldn't have gotten her to perform her work using a computer — even though for five of those 20 years a Macintosh sat a few feet from her drawing board.

Bender-Aiese's husband, Bob Aiese, an illustrator and computer consultant, helped her break through her antipathy. Bender-Aiese confessed her conversion to digital tools involved a fair amount of "kicking and screaming," although now she is just as vocal about hating to work any other way. Her workstation includes a Quadra 900 equipped with a Radius monitor and a Drawing Board II digitizing tablet from the Digitizer Products Group of CalComp Inc. of Scottsdale, Ariz.

Using Fractal Design Corp.'s Sketcher, Bender-Aiese employs the tablet to draw illustrations that are placed in a catalog layout, which is done in QuarkXPress. "If I find a photograph of a woman sitting the way I want, I'll trace her into Sketcher [using the tablet]," she said, "then copy it through the Clipboard into Quark." Other layout artwork is based on the many Polaroid photographs taken during merchandise presentations.

Although the design steps are simple, the process isn't always smooth. Bender-Aiese, who is based in New York, began working with the tablet last October and admits she still has some adjusting to do.

"The drawing tablet is difficult for someone who is used to doing it by hand," she said. "I wish the pen actually drew on the tablet. If I could see the lines I was drawing on the flat surface, I'd be happier. Your drawings initially aren't as neat and sharp. They're missing that illustration flair."

Bender-Aiese said that art schools should teach students to use digitizing tablets so they can become familiar with both traditional and digital tools at an early stage.

Despite the obvious frustrations she has endured scaling her particular learning curve, Bender-Aiese has no doubt about the benefits of working with a tablet and computer. "My revisions are almost cut down to no time by having layouts on the computer. That's where I think as a designer it is helping me the most. It's an ideal tool for clients that like to revise a lot."

The first all-desktop project she tackled was for Bloomingdale's by Mail Ltd., a mail-order catalog produced by the New York department store. A job that normally would have taken two weeks using traditional tools, Bender-Aiese accomplished it with a tablet and Quadra in half that time.

MARIO RUIZ

Recent digitizing tablet convert Arlene Bender-Aiese and husband Bob Aiese.

Bender-Aiese's move into the digital age was well-timed, as her client was also in its first year using Macs for catalog production. Bloomingdales by Mail is currently upgrading its production hardware, replacing its IIfx machines with Quadra 800 machines. Although studio manager Herma Chapel could picture uses for digitizing tablets if she had them in-house — logos could be created with Adobe Illustrator for the various sections of the catalog, she suggested — the company's current budget doesn't run that far. "It's not going to happen next Tuesday," she said, "but it's always a possibility."

Now that Bender-Aiese is growing accustomed to working with digital tools, she has found a new frustration: clients who refuse to embrace the new technology. One such client called recently requesting revisions for the fourth time — by hand. On the computer, it would take Bender-Aiese five minutes to fix; by hand, it will take two or three hours. — By Philip Bishop

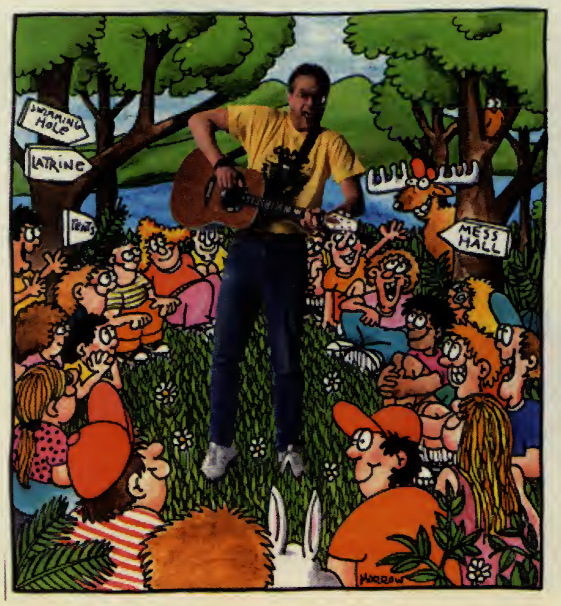
Tablets

From Page 44

The stylus is shaped, looks and generally feels like a pen or pencil, while the puck looks, feels and is used more like a mouse. Both pen and puck match the movements drawn on a tablet to an area in a document on the computer screen.

Wacom's pen has drawn praise from many quarters because its light weight makes it easy to use. Bill Niffenegger, a computer illustrator at Niffenegger Studios in Chicago, said the Wacom pen, which accompanies the ArtZ tablet he uses, has helped ease nerve and tendon stress in his arm caused by excessive mouse use. "I don't want to attribute too much to Wacom," he said, "but in my particular case, [the tablet with stylus] really was a great stress reliever."

By contrast, the CalComp and Kurta pens are larger and heavier because they both contain small batteries to power them. "I do like the Wacom pen," said former Wacom owner Aiese. "The CalComp pen, because of the way it is designed, takes a bit of getting used to. But when you finally adjust to it, it's fine."



Skip Morrow used Photoshop and a pressure-sensitive Kurta XGT/ADB tablet to assemble this poster for children's entertainer T-Bone.

Niffenegger has banished his mouse; he uses his Wacom pen for both illustration and navigation. Aiese said he would like to do the same, but he doesn't find a pen well-suited to performing such tasks as editing type.

While Aiese said his "ultimate goal is to get everything pen-based" he has another vision for digitizing tablets: not pen-based at all but glove-based. "I would love to have a glove. Instead of using the pen, use your finger. Your index finger could do the drawing, your pinkie finger could do the zoom, your thumb could do the quit." Far-fetched as this may sound, Aiese noted that similar technologies exist now as part of video-game hardware.

More wishes. On Niffenegger's wish list is a radio-controlled digitizing tablet. He said this would help him avoid getting wrapped in cables when he demonstrates computer products at trade shows using a tablet. Chelsea Sammel, an illustrator from Carmel Valley, Calif., would take Niffenegger's proposal a giant step further: Rather than merely being able to move freely with a tablet, she wants a tablet that's also a portable computer. The Sammel tablet would have a high-resolution color screen and its innards would contain both a tablet's coordinate grid and a computer's logic board plus, presumably, a storage device. Sammel, who uses both CalComp and Wacom tablets, said she has mentioned her idea several times to people in the industry, but the response usually is a good-humored chuckle followed by "nice idea, for five years down the road."

A Skip Morrow idea may see the light of day sooner. Morrow said that when he is producing artwork by hand he frequently rotates the paper he is drawing on to produce the line he wants. "To do this on the computer," he said, "I have to change my body position." Morrow said the technology should conform to his needs, not the other way around.

What he would like would be a sort of electronic Lazy Susan, a rotating shelf that makes optimum use of a corner space. In his idea, there is no mechanical movement, but rather there is a realignment of the coordinate grid inside the tablet that would mimic rotating a piece of paper. This realignment would be activated by a spring-loaded dial that you would turn with your non-drawing hand. As you turned it, the image on your computer screen would also reorient itself. Morrow said you could let go of the dial and it would snap back to a horizontal plane or click a button to lock the new view. He said Kurta is considering a way to implement his idea. □

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BUSINESS WATCH

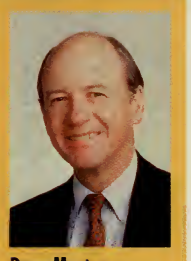
- Industry news
- Market trends

MacWEEK executive compensation survey

Finis Conner

John Young

John Sculley


Dean Morton

RANK	EXECUTIVE	COMPANY	TITLE	1992 SALARY
1	Finis Conner	Conner Peripherals Inc.	CEO	$3,486,859
2	John Young*	Hewlett-Packard Co.	CEO	$2,771,538
3	John Sculley	Apple	CEO	$1,650,158
4	Dean Morton	Hewlett-Packard Co.	Exec. VP	$1,601,648
5	Michael H. Spindler	Apple	COO	$1,126,937
6	George Fisher	Motorola Inc.	CEO	$1,116,367
7	Lawrence Ellison	Oracle Corp.	CEO	$1,100,000
8	Scott McNealy	Sun Microsystems Inc.	CEO	$995,764
9	Kenneth Olsen	Digital Equipment Corp.	CEO	$995,018
10	Ian Diery	Apple	Exec. VP	$848,637
11	Sören Olsson	Apple	Sr. VP	$785,026
12	Alan Shugart	Seagate Technology Inc.	CEO	$775,484
13	Al Eisenstat	Apple	Exec. VP	$749,164
14	John Mitchell	Motorola Inc.	VP	$745,800
15	Geoffrey Squire	Oracle Corp.	Exec. VP	$739,500
16	Jim Manzi	Lotus Development Corp.	CEO	$684,214
17	Jerome Meyer	Tektronix Inc.	CEO	$661,287
18	John Smith	Digital Equipment Corp.	Sr. VP	$655,000
19	James McCoy	Maxtor Corp.	President	$648,116
20	Laurence Hootnick	Maxtor Corp.	CEO	$593,879

The MacWEEK executive compensation survey is based on the cash compensation — including salary and bonuses — accumulated by each executive during each company's 1992 fiscal year. The figures listed do not reflect additional income derived from stock options, profit sharing or other long-term benefits.

**No longer with company. Sources: BusinessWeek, William M. Mercer Inc., company proxy statements.*

Executives cashed in despite the recession

Conner, HP CEOs top highest-paid list

By Bruce Wright

San Francisco — In the face of shifting markets, price wars and corporate downsizing, U.S. computer executives had little reason to complain when they picked up their paychecks last year.

MacWEEK's 1992 Executive Compensation Survey, based on company proxy statements and an annual survey compiled by BusinessWeek magazine, once again demonstrates that it pays to be a high-tech executive.

Even though computer companies last year cut costs and streamlined operations to cope with a stubborn recession, executives received generous salary hikes and bonuses. Exercised stock options and other perks were not included in the survey (see chart at left).

Topping the list were Finis Conner, CEO of Conner Peripherals Inc., with about $3.5 million in cash compensation, and former Hewlett-Packard Co. CEO John Young, with $2.8 million.

Conner's salary jumped 281 percent from 1991, while the disk drive maker recorded year-over-year increases of 40 percent in sales and 31 percent in profits. Young's salary dipped 12 percent; HP's annual sales and profits declined 13 percent and 26 percent, respectively.

Apple CEO John Sculley came in third, at $1.65 million, up 23 percent from a year ago. Apple's profits jumped 71 percent in 1992.

Even IBM Corp., which lost a staggering $7.4 billion in fiscal year 1992, proffered one of the sweetest deals in the industry when it tapped RJR Nabisco Inc. CEO Louis V. Gerstner Jr. to replace John Akers. Gerstner's base salary plus bonuses is expected to top $8.5 million this year. Akers, who received $2.1 million in 1991 cash compensation, did not make this year's survey.

Sun Microsystems Inc. CEO Scott McNealy's salary shrunk 37 percent, from $1.5 million to $995,764. Sun reported a 9 percent drop in fiscal year 1992 profits.

Apple had the most representatives on the list, with five. In addi-

See Executives, Page 50

Apple Europe does away with centralized model

By Caroline Bassett

Paris — Less than a year after adopting a centralized business model, Apple Europe has reverted to a regional structure, admitting its current arrangement created "conflicts" between business units.

The company last month named six regional general managers. All employees located in specific regions will now report to the new general managers.

According to industry observers, restructuring marks a repudiation of the One Europe, One Apple stratagem that left individual countries with little autonomy and no individual leadership.

In a memo to European staff, Apple said the centralized business model made decision making

See Europe, Page 50

Apple, Adobe prevail in patent-infringement dispute

By Lisa Picarille

Newport Beach, Calif. — A U.S. District Court here has cleared Apple and Adobe Systems Inc. of patent-infringement charges levied against them by a small developer.

Information International Inc., a Culver City, Calif.-based company that specializes in pre-press technology, filed the suit in 1989. It claimed that Adobe's PostScript language and Apple's LaserWriter printers and Macs infringed on a patent that covers the electronic generation and display of alphanumeric characters through the use of encoded information.

Information International sought licensing fees and royalties.

But after a five-week trial, retired federal Judge Jesse W. Curtis ruled that Adobe's and Apple's technology did not duplicate the so-called PACT computer described in Information International's patent.

"If Adobe lost the suit, it could have been enjoined from selling any PostScript-based technology," said Philip Berelson, the Palo Alto, Calif.-based attorney who represented Adobe in the suit.

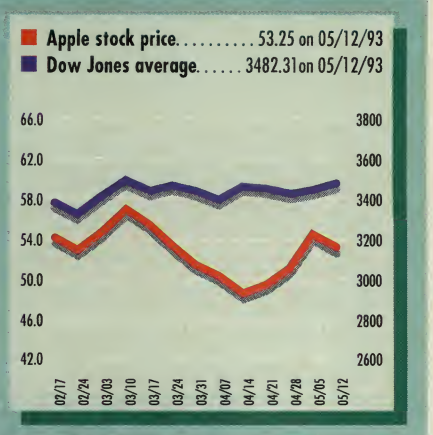
Berelson added that Information International would have also filed injunctions against Sun Microsystems Inc. and NeXT Computer Inc. if it had won the case.

Terry Taugner, vice president of finance for Information International, said the company is considering an appeal. □

StockWatch

	05.12.93 CLOSE	WEEKLY % CHANGE
Apple	53.25	-2.29
SOFTWARE DEVELOPERS		
Adobe	59.25	-2.87
Aldus	15.25	0.00
Caere	9.25	-2.63
CE Software	4.06	25.02
Microsoft	86.25	-3.36
Novell	29.75	-3.25
Symantec	16.88	8.00
PERIPHERALS VENDORS		
CMS	2.25	-5.26
HP	78.13	2.46
Mass Micro	0.38	0.00
QMS	14.75	-4.07
Radius	3.88	0.00
RasterOps	6.94	-0.89
Sigma	5.75	9.52
SuperMac	19.00	4.11
STORAGE		
Conner	13.00	1.96
Maxtor	7.13	5.56
Quantum	13.88	-4.31
Seagate	15.75	-2.33
SyQuest	13.00	0.00
INDUSTRY INDICATORS		
DEC	46.25	-1.07
IBM	48.00	-2.54
Motorola	76.00	-1.78
Sun	25.13	-7.37
Dow Jones	3482.31	0.96

Compiled by Nordby International Inc.



Maxtor inches up on sale rumor

Maxtor Corp. officials refused to comment about published rumors that the struggling company is on the selling block. However, the scuttlebutt appeared to have had a positive affect on Wall Street, where the disk-drive maker's stock rose in over-the-counter trading.

The San Jose, Calif.-based company's stock increased 5.6 percent last week to close at $7.13 per share.

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Claris on pace to top $140 million in fiscal '93 sales

By Lisa Picarille

Santa Clara, Calif. — Stepping up its ongoing campaign to gain recognition as a major software player, Claris Corp. last week disclosed a sharp rise in sales in the first three months of this year.

The company said sales for its second quarter ended March 26 were $32.5 million, up 30 percent from $24.9 million in the same quarter a year ago.

Although Apple gave Claris the green light to release sales figures this year, it still doesn't allow its software subsidiary to report net income. But that didn't stop Claris from reporting pretax earnings of $8.1 million on sales of $28.4 million for its first quarter ended Dec. 31, 1992.

Claris' sales for the first six months of fiscal 1993 increased 34 percent to $71.3 million, compared with $53.3 million for the same period last year. The company is expected to finish its fiscal year 1993 with revenues of about $140 million, which would make it the world's 10th largest software developer.

"We are on track with plans to continue to grow the business 35 percent to 40 percent year over year," said Claris President Dan Eilers. He credited the company's success to its decision to develop cross-platform applications, which has resulted in brisk sales of Windows versions of FileMaker and ClarisWorks.

"We expect for the year that Windows applications will be nearly 20 percent of the total business," Eilers said.

Also contributing to the bottom line were Claris' Clear Choice unit, although it is not expected to be extremely profitable until next fiscal year, and a 100 percent jump in Japanese sales, according to Eilers. □

Europe

From Page 48

"unnecessarily slow" and gave the computer maker "poor visibility over product availability and allocation by market and by customer segment."

When it reorganized last summer, Apple Europe moved from a country-by-country structure to five independent business units to align business more closely with customers.

Only France, far and away Apple's leading European country in terms of market share and sales, remained an independent unit.

As part of the latest reorganization Apple appointed Mike Newton, former Apple UK managing director, regional general manager for the United Kingdom and Ireland.

Also named were Gerhard Jorg, who oversees Germany, Austria and Switzerland; GianCarlo Zanni, head of France and Spain; Ronny Robbrecht, who oversees Belgium, the Netherlands and Luxembourg; Torbjorn Sjoo, in charge of Nordic countries; and Sergio Nanni, who takes over Italy.

Newton remains in charge of Apple's European Education Unit, while Robbrecht continues to head Large Accounts and Government Business.

Only the Consumer and Apple Business Services divisions will continue to operate as profit centers in Europe.

The restructuring comes on the heels of a weak second quarter, which Apple officials blamed on a sluggish European economy.

Moreover, growth of the Mac's installed base in Europe has slowed. In 1992, it was about 2.5 million units, or 7.2 percent of the European personal computer market, according to Dataquest Inc., a market research company based in San Jose, Calif. That compares with a 7.1 percent share in 1991 and 5.8 percent in 1990, according to Dataquest. □

Executives

From Page 48

tion to Sculley, the company's executives included Michael H. Spindler, chief operating officer, $1.13 million; Ian Diery, executive vice president, $849,000; Sören Olsson, senior vice president, $785,000; and Al Eisenstat, executive vice president, $749,000.

Among those who didn't make the top 20 was Microsoft Corp. CEO Bill Gates, whose 1992 salary was a relatively modest $285,000. However, Gates sold off 1.1 million shares of Microsoft stock during a two-day period for a cool $89 million. Gates' stock holdings are worth about $7 billion, making him the richest American.

Gates still did not match the 1992 financial performance of Thomas F. First Jr., CEO of Hospital Corp. of America in Nashville, Tenn. First's reported earnings of $127 million made him the highest-paid U.S. executive last year, according to BusinessWeek.

The average salary for an executive at a company that develops Mac products fell far short of the $3.8 million average garnered by executives in other U.S. industries. The top 20 executive salaries surveyed by MacWEEK averaged about $1.14 million in 1992.

CEO salaries across the nation increased on average 42 percent last year. By comparison, a teacher's salary of about $35,000 is expected to increase 42 percent over five years.

The estimated 1993 per capita income in the United States is $16,594, according to Editor & Publisher magazine of New York. □

Top Mac software companies

Developers with Mac products dominated Soft•letter's ranking of the top 100 U.S. software companies in 1992. In fact, nearly half of the companies listed had Mac products. Here is a look at the Mac companies that made the top 25:

RANK IN 100	COMPANY	1992 SALES
1	Microsoft Corp.	$3.25 billion
2	Novell Inc.	$933.4 million
3	Lotus Development Corp.	$900.1 million
4	WordPerfect Corp.	$550 million
6	Autodesk Inc.	$367.7 million
7	Adobe Systems Inc.	$265.9 million
8	Symantec Corp.	$217.8 million
9	Aldus Corp.	$174.1 million
12	Software Toolworks Inc.	$102.6 million
13	Intuit Inc.	$94.7 million
14	Broderbund Software Inc.	$86.1 million
18	ChipSoft Inc.	$50.5 million
19	Walker Richer & Quinn	$48.8 million
22	Caere Corp.	$43.1 million
23	Stac Electronics	$40.3 million

Source: Soft•letter.

Business BRIEFS

Viacom completes buyout of ICOM Simulations

New York — Viacom International Inc. last week completed its acquisition of ICOM Simulations Inc., a Mac and Windows developer.

ICOM, based in Wheeling, Ill., will be folded into Viacom New Media, a unit created by the cable TV giant in October to develop, market and distribute interactive software. ICOM's Mac products include TMON Pro, a debugger; On Cue II, an application-launch utility; Intermission, a screen-saver package; and several simulation games. Terms of the deal were not disclosed.

Micro Warehouse posts 70 percent increase in sales

South Norwalk, Conn. — Riding a crest of strong demand for Macs and IBM PCs and compatibles, Micro Warehouse Inc. last month reported a 70 percent jump in first-quarter sales.

The mail-order-catalog company, based here, posted sales of $98.8 million for the quarter ended March 31, up from $58.1 million in last year's quarter. Profits increased 41 percent to $2.8 million.

Peter Godfrey, president and CEO of Micro Warehouse, said the company's PC and Mac business increased 115 percent and 60 percent, respectively, from last year.

Apple files for $500 million bond offering

Cupertino, Calif. — In a move to bankroll construction of its new R&D headquarters here, Apple is seeking legal clearance for its first bond offering.

Documents Apple filed this month with federal regulators would allow it to issue common stock, warrants and bonds worth up to $500 million. Company spokesman Bill Slakey said, however, that Apple does not plan a new stock offering.

Although the company had more than $1 billion in cash at the end of March and no long-term debt obligations, Apple is reluctant to draw on cash reserves for the building project because much of that money is outside the United States, Slakey said. Repatriating the cash could increase Apple's tax liabilities.

Symantec wants DA off trade-secrets case

Santa Cruz, Calif. — Attorneys for the Symantec Corp. executives indicted for allegedly stealing trade secrets from rival Borland International Inc. have demanded that the county district attorney's office here be removed from the case.

In a surprise motion filed this month, attorneys for Symantec CEO Gordon E. Eubanks Jr. and Vice President Eugene Wang claimed that Jonathan Rivers, a former investigator from the district attorney's office, now is being paid by Borland to advise the company on the case. The motion, which is set to be heard June 7, asks that the case be turned over to the California attorney general for prosecution.

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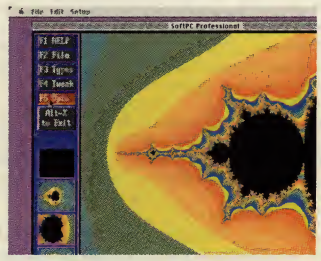

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BPA

EDITORIAL

Unix plan could be a risky one

The latest twist to the Great GUI Migration of 1993 is likely to leave Mac users with some mixed feelings.

Apple's plan to provide tools that bring Mac applications and system services to leading workstations will be a boon to users of these platforms; by the same token, it's an obvious win for the Unix vendors, bolstering their defenses against Windows NT. In some ways current Mac users stand to benefit, too: By expanding the potential market for Mac applications, it will provide an extra incentive to developers to treat Apple's application programming interface as a high priority not just an afterthought to Windows.

The catch for current customers is that many of the system services the company is now promising Unix users — notably the AOCE (Apple Open Collaboration Environment) and QuickDraw GX — are still not available for Apple's own hardware, and they are even farther away for what should be its first porting priority, Windows. As for the company's announced intention to bring to the Mac operating system many of the features Unix users already enjoy, such as multithreading and memory protection, there's been little signs of progress on this front.

Likewise, Apple is promising new tools to facilitate development of Unix applications that use its services, but it has yet to deliver tools much more critical to the future of the Mac, such as a PowerPC compiler and the Bedrock framework.

What concerns us is not the moral issue — that Apple owes first priority to its loyal customers — but concrete questions of resource allocation. Even though the company can no doubt count on assistance from its new allies in the Unix market, and even though Echo Logic Inc.'s FlashPort technology is providing a shortcut to the new platforms, the effort is bound to require a considerable investment of engineering talent and management attention. And this is at a time when Apple is stretched thin supporting an already overwhelming agenda.

We admire Apple's ambition and aggressiveness. But the company needs to remember the risks of overreaching. □

Commentary

The good, the bad and the telephony make for options

JEAN-LOUIS GASSÉE

Someone, somewhere had an epiphany: A lot of people use telephones a lot.

That someone was Microsoft Corp. And this revelation resulted in the Windows Telephony API (application programming interface). Seriously, there is much to like in the recent Microsoft/Intel Corp. alliance, and it brings up a few questions about Apple's telephony strategy.

One moment please. So far, the telephone and personal computer have had a tentative relationship — forced to cohabitate but obviously not created with each other in mind.

Yet, on closer examination, they can do a lot for each other. Central-office switches and PBXs offer a wealth of call-management and signaling features, but few are used by normal people. One example: Try setting up a long-distance conference yourself using a known, reliable service such as AT&T Alliance. It's worse than programming your VCR.

Computers should do this. The storage, processing power and, above all, the graphical user interface on most personal computers are the tools that can bridge the gap.

Microsoft's Telephony API finally makes the marriage between personal computers and telephones official. It almost doesn't matter how good the API will be, it is The Right Choice from now on.

Speaking of which, the Telephony API also instantly creates an obligation for the telephone industry to support it, by either documenting or cleaning up the array of services hidden inside phone companies' networks.

If CompuServe activity is any indication, there is very strong interest in the topic. The API document is available on-line, all 450 pages, and CompuServe must have made a bundle sending the Telephony API over the telephone wires.

Busy signal. Where does this leave Apple? The subject is a natural one for a user-centric computer company. Indeed, in the early days of the Macintosh, Steve Jobs started the MacPhone project. Coincidentally, MacPhone was managed by the same individual, Steve Sakoman, who later started Apple's Newton project.

Today, there is a MacPhone reincarnation living on the desks of some Apple Cupertino employees. But it's a precarious life: dedicated software and hardware connecting their (expensive, proprietary) digital but non-ISDN (Integrated Services Digital Network) telephones to their PBX. Use of the system is actively discouraged by Apple's central telecommunications organization.

But there is hope. Real soon now, the digital signal processor-equipped Cyclone will offer developers Mac-telephone integration. And by the time you read this, at least one telephony application will have been demonstrated at the Apple Worldwide Developers Conference.

History will tell if it is another case where Microsoft takes notice of what trails others are blazing and builds the superhighways.

Or it could be much simpler. After years of Apple multimedia efforts, someone might ask how often people are editing video presentations vs. how often they use telephones.

Of course, there is the delicate subject of software availability. What we have is the description of a Windows API, not software. Apple, on the other hand, has hardware and software it can demonstrate and a well-defined target obligingly supplied by Microsoft. It's a great opportunity for Apple engineers. And a fresh topic for executive speeches. □

LETTERS

Doctor tells Ramsey: Caffeine is not all it's cracked up to be

I have always respected David Ramsey's helpful question-and-answer column. However, in "Caffeine can be your friend" (MacWEEK, April 19) he is treading on territory about which he clearly does not possess expert knowledge, namely health care. To his credit, he apparently consulted a medical expert, Dr. Bob Seaver (whom I presume is a medical doctor), but either Dr. Seaver needs to do a little more research or Ramsey took his conclusions beyond the data Dr. Seaver gave him.

To the point, Ramsey said, "Caffeine makes you smarter." Caffeine neither increases your knowledge nor your wisdom. It only temporarily increases your level of alertness. If you have been up all night cramming for a test, you can certainly benefit from a morning cup of coffee to partially correct the physical abuse of lack of sleep. However, as to, "People dosed with caffeine perform significantly better on standardized tests," the following key points must be made.

These studies compared the performance of people who did not habitually use caffeine. In other words, in those who do not routinely use caffeine, caffeine may on a single-use basis convey a slight but measurable advantage over those who did not use caffeine. However, the study goes on to compare those who habitually use caffeine with those who do not use caffeine and in these habituated persons caffeine gave no benefit. In fact, these habituated people did worse than normal when their caffeine was withheld. The body quickly adapts as best it can to the constant stimulation of caffeine. Those who use caffeine daily use it only to prevent withdrawal symptoms.

Even more disturbing is Ramsey's statement that "there seem to be no adverse consequences associated with long-term use." I'm shocked that he would make such a sweeping misstatement. Caffeine has been linked to many problems such as fibrocystic disease of the breast, kidney stones, bladder cancer and fatal cardiac arrhythmias. In fact, although caffeine has not been directly linked to causing heart attacks, caffeine users who do have a heart attack are up to two times more likely to die from that heart attack. These consequences certainly do not strike all users of caffeine, just as not all smokers get lung cancer and not all alcoholics get cirrhosis, but it is not a drug without a dark side.

At an Apple Worldwide Developers Conference, Apple Chief Operating Officer Michael H. Spindler displayed the image of a rocket blasting off and praised the assembled thousands of developers with the words, "YOU are the rocket fuel of this industry!" I smiled when the developer next to me quipped, "I thought it was Jolt cola!" I, too, can relate that I have done some of my best coding in the wee hours of the morning, and at times with the aid of a caffeinated beverage. But one should pick one's poison intelligently and be aware that all drugs have risks.

Ted Hoehn, M.D., fellow of the American College of Emergency Physicians, and owner, Computed Designs, Bloomington, Ind.

Better clean your hard disks because this is a RAID!

Technology Forums is the facilitator of the RAID Advisory Board, an industry trade association. An important objective of the RAID Advisory Board is the promotion of RAID technology. Another is to eliminate the confusion that exists over such matters as definitions of the various RAID levels, performance criteria and differentiation between RAID and SLED (single large expensive disk) products.

The perpetuation of confusion and error in David Ramsey's column "Ramsey on RAID Systems" (MacWEEK, March 15) is, therefore, deplored by the RAID Advisory Board.

The original definition of the RAID acronym included "inexpensive" for "I," as in redundant array of inexpensive disks. But the 32-member board and others have opted to substitute the word independent for inexpensive. This reflects the fact that RAID storage systems are currently not inexpensive compared with SLEDs. In fact, a case could be made for changing the SLED acronym to SLID using the "I" there for inexpensive.

The statement that "RAID ... is a group of standards ... " is incorrect. The acronym RAID was first used in a series of papers by academia several years ago. These have come to be known as the Berkeley Papers and were an important common frame of reference for various disk array architectures. Most disk array suppliers use the RAID levels defined by the Berkeley papers to describe the overall architectural approach of their products. Implementations of a given RAID level vary widely, however. There are standardization efforts under way in the areas of testing, host interface and drive interface. The RAID Advisory Board is an important force behind those efforts — efforts that will benefit ends users in these ways:

- Eventual plug compatibility at the drive and subsystem levels.
- Meaningfully comparable tests and benchmarks.
- Increased technical innovation and differentiation. RAID suppliers will not have to expend energy on mundane items such as spindle synchronization.

Joe Molina, president, Technology Forums Lino Lakes, Minn.

Send letters to MacWEEK, 301 Howard St., 15th Floor, San Francisco, Calif. 94105. MCI 323-1203; Internet, letters@macweek.ziff.com; fax (415) 243-3650. Include your name, address and phone number. Letters should not exceed 300 words. We reserve the right to edit for clarity and length.

The Mac Manager

After scripting revolution, only prepared will prosper

DON CRABB

Here's the scene. Mary, sitting at her Mac, is working on a report for next year's capital budget. She punches in some numbers then includes some companywide fiscal estimates into her projection models. Finally, she clicks on the Solve button and gets a beautifully formatted report that's chock full of color graphics, QuickTime movies and sound bites. What application produces this analytic and reporting bounty? Why it's Maryware, of course.

What is Maryware? In this case, it's a combination of ACI US Inc.'s 4D, Microsoft Excel, Oracle Corp.'s Oracle, Microsoft Word, Claris Corp.'s FileMaker, Occam Research Corp.'s Muse, Aldus PageMaker, MapInfo Corp.'s MapInfo and Adobe Illustrator. The combination was created with AppleScript and UserLand Frontier, which Mary used to build her own "capital budget application" that can be run from the desktop. It assembles her report using each application to massage or provide key data, and it doesn't care one whit about the data formats involved or the state of the system.

And you can have your own version of Maryware now, if you use either Frontier or the AppleScript Developer's Kit. Although they work differently (Frontier uses the structured C-language approach, while AppleScript opts for pseudo-English HyperTalk-like commands), the results that these user scripting systems produce can revolutionize the way Macs are used.

Instead of trying to build a macro that works only if the state of the application is known ahead of time, user scripting works at the system level. System scripts work through Apple events-aware applications, not on top of them as macros do.

That alone changes the manner in which you will interact with Macs. Couple that with more Apple events and related system services such as AOCE (Apple Open Collaboration Environment), and we're talking a real paradigm shift.

Manual or automatic? When we have a paradigm shift in our society, we can also have nasty social fallout. The same thing may happen to your local Mac community if you don't start planning now for the changes that user scripting portends.

Understand that your users will need real scripting training, not just a quickie course in how to put their Macs on automatic pilot.

In short, you'll need to train them to be real user programmers. That doesn't mean making their thinking rigid or heaping piles of formalisms on them. What it means, simply, is teaching them how scripts work. It means teaching them the four basic programming arts: recovery, invention, presentation and systematization — and how to apply them in a system scripting context.

Learning to program. Fortunately, you don't have to be a programmer to develop and use user scripts. But learning about programming doesn't make you a programmer any more than learning CPR makes you a cardiac surgeon.

Being a good user scriptor will mean understanding better how a Mac works. And the only way to do that is to learn something about how a script interacts with the system, as well as how to actually construct one. If you put scripting training programs in place now for your Mac people, you will not only be heading off potential support problems, you will also be qualifying users to make use of a truly revolutionary Mac technology. □

"Next time, tell him what kind of file you mean."

Mac Soapbox by Paul D. Lehrman

MIDI doesn't need any hints

Steve Rosenthal's recent New Media column on MIDI and its role in multimedia (see MacWEEK, April 12) raised a lot of eyebrows in the music community. It was pretty distressing to see such serious misconceptions about how MIDI works and proposed "solutions" for problems that don't exist. If real music — not bleeps, bloops and tinny sound bites — is going to make its rightful contribution to multimedia, it's crucial that the Macintosh community be given a better understanding of what a powerful, and appropriate, tool MIDI is for the job.

First, a couple of fact checks: The organization that oversees the MIDI (Musical Instrument Digital Interface) specification in America and Europe is the MIDI Manufacturers Association, not the Music Manufacturers Association. It did not create MIDI: The specification was the work of several individuals in various companies, and the MMA was formed more than a year later.

Because it was designed for flexibility and universality, MIDI leaves the interpretation of data to the receiving device; it has no way of knowing what the device can do. And most casual users have no interest in tweaking MIDI files to make them sound good with the hardware they happen to be using.

Po-tay-toe, pa-tah-toe ... For nonmusicians, as Rosenthal said, this can create major problems. But General MIDI (GM), which Rosenthal unfortunately barely mentions, tackles it head-on.

General MIDI is a subset of the MIDI specification that tells everyone involved, from the creator of a MIDI file to its listener, *exactly* what the receiving hardware is capable of. No longer is there a "you say po-tay-toe, I say pa-tah-toe" disagreement among playback modules: Every GM instrument has the same 128 instrumental sounds and effects mapped to the same program-change numbers; has the same percussion sounds mapped to the same notes; can play at least 24 notes on 16 MIDI channels simultaneously; and understands the same set of controllers, such as volume, pan and sustain pedal.

A file created using one GM instrument will be completely recognizable when played back on any other, regardless of any disparities in quality. There will be no loss of notes or channels, and little or no change in the instrumental balance.

The multimedia market. General MIDI was created to improve the quality of multimedia sound, but it wasn't intended for the lowest common denominator and will indeed have problems with low-end sound hardware. This issue, however, is being dealt with in several ways.

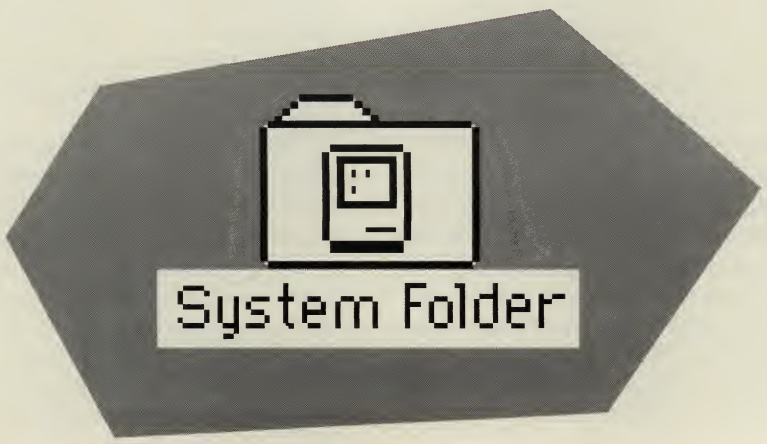
First, the MMA and its Japanese counterpart are writing authoring standards for General MIDI files, and they are likely to include guidelines for prioritizing musical information to accommodate lower-performance platforms. MIDI itself still won't know what the receiving device is capable of, but the *files* will.

Second, many manufacturers are including in their hardware the musical equivalent of the "hinting" that Rosenthal craves: It's called "voice stealing," and it means that if an instrument receives more notes than it can play, it makes decisions about which ones to leave out, based on loudness, chronological order, channel number or other criteria.

In addition, economics are on General MIDI's side. Sound quality that cost $800 a year ago sells for half that now. Complete GM instruments on chips are coming soon, and they will make it possible for GM instruments to compete in the same price class as the Ad Libs and Sound Blasters of the world or even be supplied on the logic boards of multimedia computers.

GM, being platform-independent, has the best chance of any music format for being accepted equally on all platforms. Already, Microsoft Corp. has incorporated it into its multimedia specs. If General MIDI's progress continues unimpeded, then Rosenthal's prediction — that the problems of music playback between different machines will be made moot — should come true. But it isn't going to happen by rewriting MIDI; it's going to happen by embracing MIDI for what it can do already. □

The author, a former contributing editor to MacUser, is a composer and a consultant to the music and computer industries. He is on the executive board of the MIDI Manufacturers Association and teaches at the University of Massachusetts-Lowell. He is co-author of "MIDI For The Professional," to be published this summer by Music Sales Corp.



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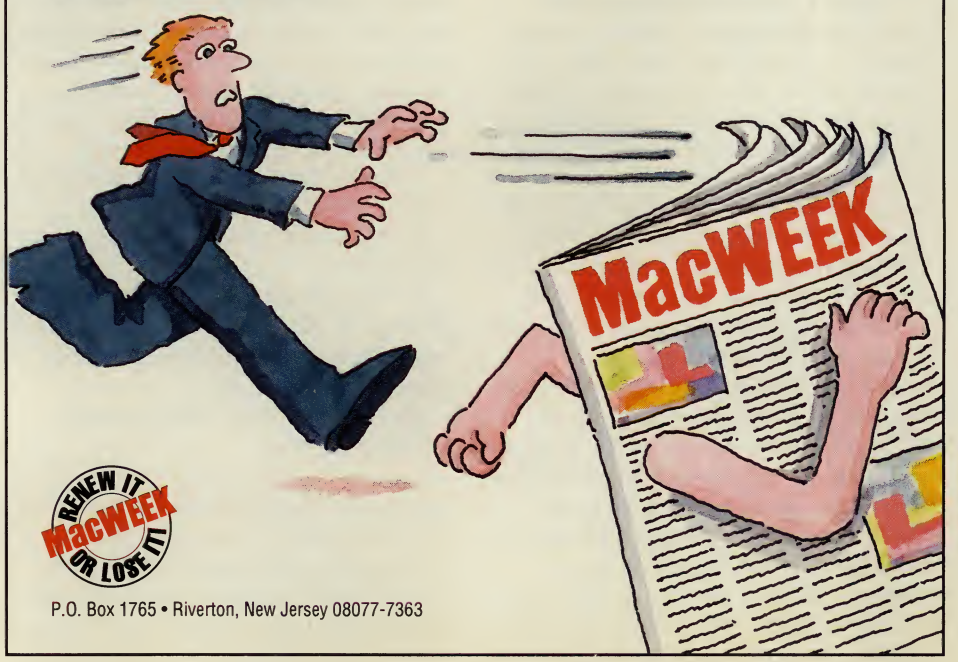

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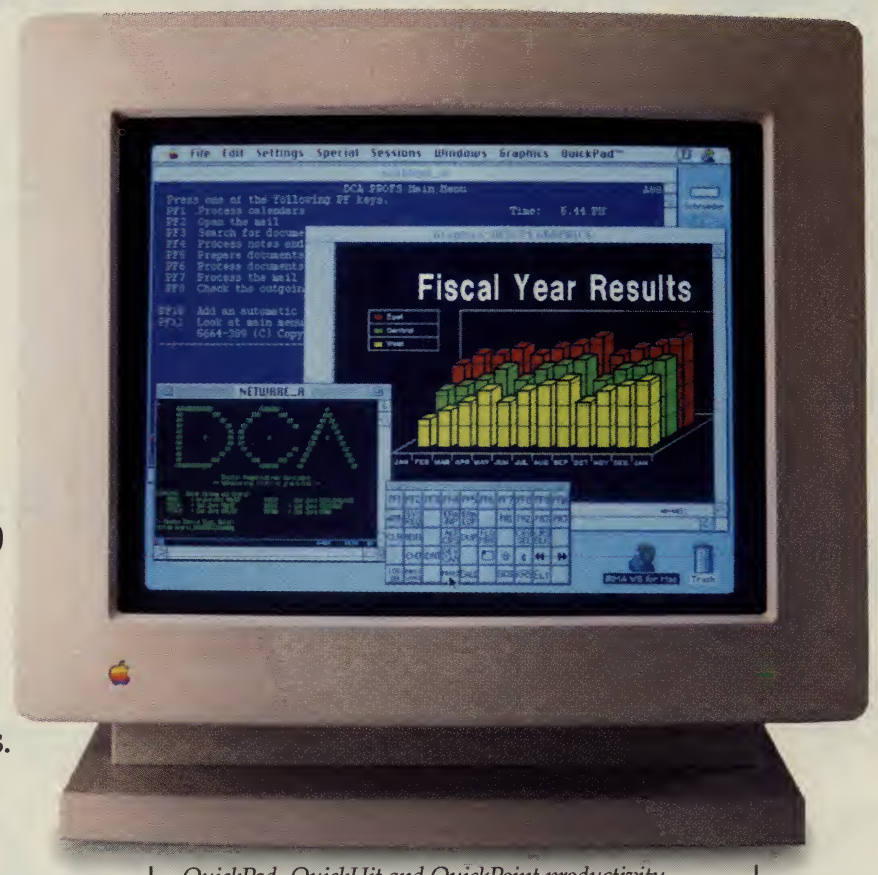

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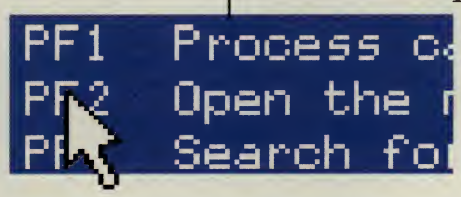

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Comparison

DayStar, Fusion 68040 cards light fire under older Macs

Speed IIci, older Macs to Quadra levels

By Sean Wagstaff

The Motorola 68040 chip brought new levels of performance — and incompatibility — to the Macintosh when Apple introduced it in the Quadra series in late 1991. Today, the performance benefits are still just as real, but the problems of incompatibility with the 68040 have all but vanished. Most major software vendors have released '040-compatible versions of their applications, and the stragglers are generally catching up.

It follows that it's about time to upgrade your Mac IIci machines and older desktop Macs to the Quadra and Centris levels. The options, however, remain fairly few: You can scrap the older Macs and replace them with Apple's latest models, you can upgrade existing Mac IIci machines to Quadra 700s, or you can boost the CPU in your existing Mac with something a little closer to the cutting edge. Two companies known for price and performance in the accelerator market — DayStar Digital Inc. and Fusion Data Systems Inc. — now offer solutions for accelerating the older Macs with processor direct slots.

Unlike Radius Inc.'s Rocket, a NuBus card that offers its own advantages and pitfalls (see story, Page 60), DayStar's Turbo 040 and Fusion's TokaMac use the Mac's PDS to directly replace the existing chip on the Mac's motherboard. The accelerators come in a number of configurations, ranging from inexpensive, 25-MHz versions without a RAM cache to supercharged, 40-MHz, cache-enhanced monsters that outpace Apple's latest '040 machines. Both companies sell versions that can be installed in the Mac IIci and IIsi. In addition, Fusion sells a version of its card for the LC and LC II. Accelerators for other Mac models, such as the Mac II, IIcx, IIx and SE/30 , are in the works from both companies (see story above). For this review, we tested the accelerators in a Mac IIci, concentrating

See '040s, Page 59

RATINGS KEY

- ◆◆◆◆◆ *Excellent*
- ◆◆◆◆ *Very good*
- ◆◆◆ *Good*
- ◆◆ *Fair*
- ◆ *Unsatisfactory*

Filling out the accelerator line

Both DayStar Digital Inc. and Fusion Data Systems Inc. have been shipping versions of their accelerator cards for the Mac IIci and IIsi.

In addition to supporting those Mac models (as well as the SE/30), Fusion offers 25-MHz TokaMac cards for the Mac LC and a 33-MHz '040 card for the Mac IIfx. The latter model, the TokaMac II FX 33, requires a slight alteration to the IIfx motherboard. (We are testing this card and plan to review it in a future issue.) Fusion does not offer 40-MHz versions of any of its cards but said it will support the higher speed when the chips are available in quantity.

DayStar said that versions of the Turbo 040 for the Mac II, IIx, IIcx and SE/30 will be available in early June. At press time, the company was selling the 40-MHz Turbo 040 for the Mac IIci and IIsi in limited quantities.

score card

68040 accelerators

The prices of 68040 accelerators have fallen significantly, and compatibility problems have all but disappeared. Two companies are engaged in a battle over the accelerator market, and each offers similar features and upgrade policies to more powerful (and future) models. In both cases, we highly recommend the optional 128-Kbyte cache, which is a better value than the accelerators themselves. DayStar Digital Inc.'s beta 40-MHz board 040 (which has shipped in limited quantity since our review was conducted) made our IIci in many respects the fastest Mac we've ever tested. Fusion Data Systems Inc., the other contender, will also ship a 40-MHz version as soon as Motorola provides chips in greater quantity.

▶ **DayStar's 33-MHz Turbo 040** was dropped into our IIci's processor direct slot, the software was installed by double-clicking, and the whole thing was running at Quadra 950 speeds in minutes. The upgrade was painless, and performance will make IIci users blink. The board won't run A/UX, but otherwise, its compatibility was excellent. For users who rely on disk-intensive applications and internal video, the Quadras give you a slight edge. For the money, however, the DayStar board is an excellent value. The FastCache Turbo daughterboard is also easily installed and doesn't require a board swap.

▶ **Fusion's TokaMac 33c** contains an on-board cache (the TokaMac 33 does not). Installation was not nearly as smooth as that with the DayStar; we had to put memory in our second RAM bank, and the board was incompatible with our existing hard disk drivers, forcing us to update them. It is incompatible not only with A/UX, but also virtual memory. Otherwise, the Fusion board is on par with the DayStar in every respect and even beat it by 1 percent or 2 percent in some benchmarks. The TokaMac 33c is a very good value.

	33-MHz Turbo 040	TokaMac 33c
Overall value	◆◆◆◆◆	◆◆◆◆
Price	$1,798*	$1,895
Performance	◆◆◆◆◆	◆◆◆◆◆
Features	◆◆◆◆◆	◆◆◆◆◆
Compatibility	◆◆◆◆	◆◆◆◆
Configuration	◆◆◆◆◆	◆◆◆
Documentation/support	◆◆◆◆	◆◆◆◆

** Price includes FastCache Turbo installed.*

La Cie makes a push for the gold with latest version of its flatbed scanner

Silverscanner II uses improved engine

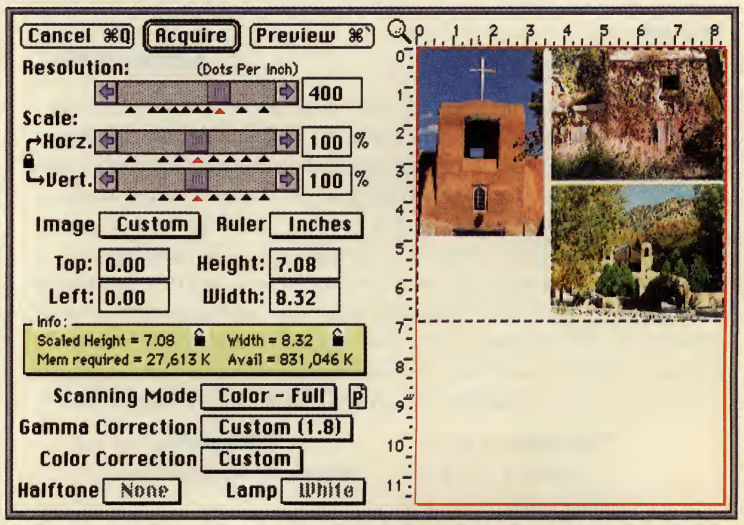
By Bruce Fraser

La Cie Ltd.'s original Silverscanner package had arguably the best and most full-featured Adobe Photoshop plug-in driver available for a flatbed scanner, but it was marred by less-than-stellar scanning hardware from Epson America Inc. and by confusing and undocumented gamma and color-correction settings.

That was the conclusion we reached six months ago when we reviewed the Silverscanner (see MacWEEK, Nov. 2, 1992). Now, with the release of the Silverscanner II, we're pleased to report that its good software has become even better, and the new nine-bit Epson engine, while not perfect, is a vast improvement over the old. La Cie also threw in a complete manual that describes the potentially confusing new gamma, color-correction and calibration controls. The entire package, including Photoshop 2.5 and Olduvai Corp.'s Read-It! O.C.R. Pro, lists for $1,999.

Start your engine. The new engine is considerably easier to set up than the old: The SCSI ID selector is an external push button rather than an internal rotary switch; the shipping lock is released by a large knurled knob — no more screws to lose — and the SCSI termination is via an external terminator included in the package. It has an optical resolution of 400 by 800

See Silverscanner, next page



With Silverscanner's controls you choose the resolution and scaling percentage from the slider bars. The image control functions as a combination brightness-and-contrast control. Here it reads Custom because we used the Advanced Controls to create a custom setting.

Silverscanner *From previous page*

dpi, an image area that accommodates letter- or A4-size originals, and it captures nine bits each of RGB (red, green, blue) information per pixel, providing considerably more shadow detail than the old scanner. Like its predecessor, the Silverscanner II is a one-pass scanner that uses three light sources, but it's much faster: A 300-dpi, 4-by-5-inch scan takes just less than one minute — two to three times faster than La Cie's previous scanner.

When we ran our suite of synthetic tests for repeatability and gray balance, we found that the scanner's light sources are very stable. The only differences we saw between identical scans performed 10 minutes apart were clearly the result of noise in the CCD (charge-coupled device), which is simply a fact of life with scanners in this price range. Even then, it had less noise than most eight-bit scanners, and it compared quite well with the 10-bit Agfa Arcus, which we also reviewed last year (see MacWEEK, Nov. 2, 1992). We saw no evidence of jitter in the mechanism.

We conducted our gray-balance test twice, once using the default settings and once with all gamma correction, color correction and calibration turned off. The latter gave us a good picture of the actual engine's performance without software intervention. We found that in its raw state the scanner has a slight propensity to scan red in the highlights and blue in the shadows. When we used the default settings we found that they actually exacerbated this tendency. A call to La Cie revealed that it is still experimenting with default settings; revised software that arrived the following day largely addressed the problem.

On the fringe. We did uncover one problem with the engine that some potential users may find serious. Because the scanner's multiple light sources strike the image at different angles, any originals that aren't perfectly flat will cause color fringing. We noticed color fringes around the edges of the paper on most photographs we scanned. These can be cropped out because they don't normally lie within the image area.

But when we scanned color images at 400 dpi, we also noticed some color fringing along high-contrast edges in the image itself. This was more noticeable on glossy originals than on matte ones; we suspect it is caused in part by the three light sources being refracted through the glossy coating on the paper. At resolutions of less than 350 dpi, the problem disappeared.

> Top-of-the-line software brings Silverscanner II close to the ideal of push-button scanning.

Most users will probably never run into this problem, but if you need to scan color originals at maximum resolution — for example, when you want to enlarge an image detail — you may find this a critical shortcoming. Aside from this, the scanner engine was very well-behaved.

Software that shines. But even the best engine is an expensive doorstop without software, and that's where the Silverscanner II package really excels. From the zoomable color preview image to the Command-key-driven controls, it's loaded with productivity features. It provides everything the novice needs in a single window, while the more advanced features are hidden but readily accessible to the power user.

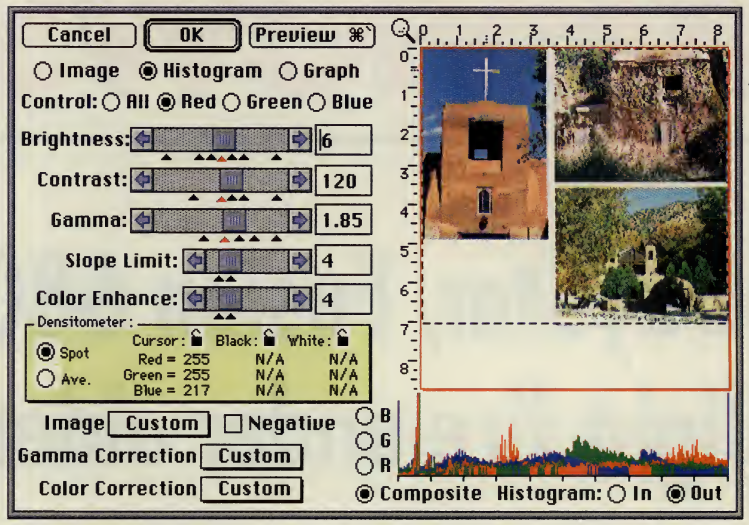
Command keys let you invoke both the preview scan and the full scan. One noteworthy feature here, as in the previous model, is that the Silverscanner doesn't make you wait for the preview scan to finish redrawing before it starts the full scan. (Many other scanners will return an error message if you issue a command while the scan head is still traveling.) Likewise, you can set the cropping marquee without waiting for the scan head to finish its travel, either by dragging a selection or by entering numerical values for Top, Left, Width and Height.

You can also move the entire selection marquee without changing its size. This is particularly useful when you want to make quick scans of several same-size originals. One Command-keystroke starts the preview: As soon as the image position on the scanner bed is apparent, you can move the selection marquee then press Return or Enter to initiate the full scan. As soon as the scan is completed, you can place a new original on the scanner and repeat the process, which makes for very productive scanning.

You set the scanning resolution and the scaling percentage via sliders. Often-used presets can be chosen by clicking the small arrows under the sliders. An information display makes it easy to scan an image exactly to size: The display shows the scaled height and width, the storage space required for the image, and the available storage.

Instead of using separate contrast and brightness controls, which generally must be adjusted several times since one affects the other, the Silverscanner plug-in offers an image control that adjusts brightness and contrast together. (Separate brightness and contrast settings are available in the Gamma Correction window, if required.) The effects of different settings are displayed interactively in the preview.

Nine ways to scan. The scanner offers nine different scanning modes: full 24-bit-color, 256 colors, 64 colors, eight colors, 256 grays, 16 grays, four grays, halftone (for gray-scale images only) and line art. In line-art mode you can use any or all of the three light sources, which is useful if you want to scan hard copy that's been marked up in red pen without getting the pen marks, for example. In halftone mode, you can choose one of several screen types. The halftones that result are good for inkjet or laser printers, but for most purposes you're better off scanning in gray scale and letting an application do the halftoning.



The Advanced Controls let you create and save custom settings for the image, gamma-correction and color-correction controls. You can set the brightness, contrast and gamma separately for each of the three channels. The preview updates interactively to reflect the changes you make. For more information, you can use the on-screen densitometer or view a histogram of the input and output values.

The optical resolution of the scanner is 400 by 800 dpi, but software interpolation allows you to scan up to 1,600 dpi. This is very useful for line art, particularly when you're scanning an original for auto-tracing by using a program such as Adobe Systems Inc.'s Streamline; curves and diagonals are much smoother, resulting in fewer control points in the auto-traced output. For color or gray-scale scanning, it's less useful, particularly in light of the color-fringing problem mentioned earlier. But in general, interpolation isn't useful in color or gray-scale scans. Like other scanners, the Silverscanner can't give you something for nothing.

Colored perceptions. In the first Silverscanner, settings for gamma and color correction were difficult to understand, partly because the names given to the settings weren't terribly informative and partly because they were completely undocumented. While La Cie has corrected the documentation problem, the company has delivered a tool kit instead of a solution.

For color work, the Photoshop plug-in offers preset options for gamma and color correction and also offers a default calibration setting. These give decent results on most images, but the fact that La Cie is still experimenting with them indicates that better results await those who use the more advanced settings. These are quite complex, but they offer the knowledgeable (or extremely patient) user a great deal of control over the scan.

Working with these controls offers an important advantage over correcting the image post-scan in Photoshop. When you correct an image in Photoshop, you're working on only eight bits of data per color. As you make corrections, rounding errors cause some levels to drop out and others to intensify — a histogram of a heavily corrected image looks like a comb. The Silverscanner controls work directly on the nine bits of data per color that the scanner captures and control the conversion of those nine bits to the eight bits that the Mac can handle, so you get the best possible eight-bit data.

One of these controls, the Calibration window, lets you set limits for black and white, applying the tone compression necessary for most print work directly in the scan. It also lets you set the brightness, contrast and gamma curve both overall and for each of the three channels. You can view the effects of these settings interactively in the preview image, in an on-screen histogram, and with an on-screen densitometer that provides a readout of the RGB values for the pixel or group of pixels under the cursor.

The Advanced Controls window offers brightness, contrast and gamma controls similar to those found in the Calibration window. It also has a Color Enhancement control, which increases the saturation of pure colors, and a Slope Limit control, which mitigates banding in the shadows produced by large amounts of gamma correction. Again, the effects of different settings can been seen in the preview, the histogram and the densitometer readout. The settings of the brightness, contrast and gamma controls in the Advanced Controls window are added to those in the Calibration window, which is initially confusing. The idea seems to be to use the calibration settings to establish a consistent baseline setting, then

See Silverscanner, next page

score card

Silverscanner II

La Cie Ltd.
Overall value ◆◆◆◆ **List price: $1,999***

With the Silverscanner II, La Cie Ltd. has improved on software that was already among the best in its category, while addressing the shortcomings of the previous scanner engine. As a gray-scale or line-art scanner, it offers productivity that anything else in the price range would find hard to approach. For color work, it may take some experimentation to fully unlock the scanner's potential, but La Cie has done an excellent job of providing the necessary tools. Some users might also be dismayed with the color fringing that can occur with the scanner, but in general, the Silverscanner II offers an excellent compromise between basic eight-bit-per-color scanners and the considerably more expensive 10-bit-per-color scanners from Agfa and UMAX Technologies Inc.

Performance ◆◆◆◆ **Compatibility** ◆◆◆◆◆
Features ◆◆◆◆◆ **Documentation/support** ◆◆◆◆
Configuration ◆◆◆◆◆

** Includes Adobe Photoshop 2.5 and Olduvai Corp.'s Read-It! O.C.R. Pro; with Read-It! O.C.R. Pro and Timeworks Inc.'s Color-It!, $1,599; with Photoshop 2.5, Fractal Design Corp.'s ColorStudio and Read-It! O.C.R. Pro, $2,099.*

Silverscanner

From previous page

tweak the Advanced Controls settings to accommodate different types of images.

Another set of advanced controls lets you experiment with the color-correction settings. These allow you to fine-tune the gray balance by controlling the amount of the other two colors present in each channel. To make the most of these, a good gray-scale target is essential.

A note in the dialog box says the sum of the RGB values should equal 32 in each channel. Other than that, you're pretty much on your own. In skilled hands, this is a powerful tool, but be prepared for a long learning curve before you master it completely. You can, however, save multiple settings for calibration, Advanced Controls and color correction, and set up a default configuration that automatically loads the designated settings each time you open the plug-in. This takes some of the sting out of the trial-and-error process of arriving at the optimum settings.

Documentation, support. The manual, which was conspicuously absent from the original Silverscanner package, is clear and well-organized in the new product. In addition to covering those features specific to the Silverscanner II, it includes a good primer to general scanning. It also provides a realistic discussion of the limitations of flatbed scanners — recommending, for example, that you send out for scans for magazine covers.

Conclusions. The Silverscanner II is an excellent all-round scanner. For line art, gray-scale and noncritical color work, the top-of-the-line software brings it very close to the ideal of push-button scanning. With a bit more effort and a certain level of skill on the part of the user, it can deliver color performance that surpasses anything else in the less-than-$2,000 price range, including the popular ScanJet IIc from Hewlett-Packard Co. For those who want more than an eight-bit scanner can deliver but can't reconcile themselves to the cost of a 10-bit scanner like the Agfa Arcus or UMAX Technologies Inc.'s UC1200, the Silverscanner II provides the ideal compromise.

The Silverscanner can also be purchased with Timeworks Inc.'s Color It! and Olduvai's Read-It! O.C.R. Pro for $1,599, and with Photoshop 2.5, Fractal Design Corp.'s ColorStudio and Read-It! O.C.R. Pro for $2,099.

La Cie Ltd. is at 8700 S.W. Creekside Place, Beaverton, Ore. 97005. Phone (503) 520-9000 or (800) 999-1477; fax (503) 520-9100. □

'040s

From Page 57

chiefly on the 33-MHz versions from both companies.

DayStar has kept with the universal-card concept used in the company's 68030 accelerators, to make the board compatible with a variety of PDS-equipped Macs by using a low-cost (about $50) adapter card. Fusion, on the other hand, makes unique cards for the various Mac models.

Both Fusion and DayStar splinter their '040 accelerators into multiple models with and without on-board cache. Unlike DayStar's '030-based accelerators, which had an integral cache on the card, the Turbo 040 has a connector that can accept a 128-Kbyte static-RAM cache card — called the FastCache Turbo — as an option. Fusion, meanwhile, puts its cache directly on the accelerator board. While DayStar's approach is certainly easier if you want to upgrade to the cache later, Fusion will allow you to swap your cacheless card for one with on-board cache for the difference in list prices.

The pricing game. Fusion's TokaMac 33c, a 33-MHz model with a 128-Kbyte static-RAM on-board cache, is sold by Fusion for $1,795; a version without the cache, the TokaMac 33, costs $1,595. Although Fusion concentrates on direct sales, there are a few retailers that carry the boards.

DayStar's boards are available from numerous mail-order and retail dealers. The 33-MHz Turbo 040 has a list price of $1,599; the FastCache Turbo costs $199.

In the case of both boards, the performance gained from the extra cache is easily worth the extra money. In other words, based on price and features, the two companies are in a dead heat. To make decisions even harder, both companies have equivalent trade-in policies that let you trade in an old accelerator for the difference in price between the model you're trading in and the model you're buying. Fusion offers a one-year warranty and a 30-day money-back guarantee, while DayStar ups the ante with a three-year warranty.

High performance. The upgrade policies are particularly interesting in light of the impending full-scale availability of 40-MHz '040s from Motorola Inc. Both DayStar and Fusion have announced 40-MHz versions of their boards, which should make your IIci the fastest Mac on the block. We used a prototype 40-MHz Turbo 040 (with the cache option) from DayStar,

> For both boards, the performance gained from the extra cache is easily worth the extra money.

and it proved as reliable as its 33-MHz sibling. Running on a IIci, it generally was faster than the fastest shipping Mac, a Quadra 800 (see benchmarks below). DayStar shipped the 40-MHz board too late for a formal review.

The 33-MHz boards, with the 128-Kbyte cache options, ran a virtual tie in our performance tests. In Adobe Photoshop performance — a 113-degree arbitrary rotation of a 1-Mbyte image, and the application of the Distort filter from HSC Software Inc.'s Kai's Power Tools — the boards differed by less than 1 percent. Likewise, it took both programs about nine minutes to execute a ray tracing of a complex model in Alias Research Inc.'s Sketch!

These numbers put both boards on the IIci at roughly Quadra 950 speeds and a little slower than the Quadra 800.

Admittedly, the benchmarks don't take into account the performance of the NuBus and SCSI subsystems, which also depend on SCSI-disk and NuBus-board performance. Applications such as video and multimedia, which move a lot of data around, should get better performance from Apple's high-end '040 Macs, which have boosted the performance of these subsystems.

In our image-rotation tests,

See '040s, next page

Methods we used to test the '040 accelerators

To review the DayStar Digital Inc. and Fusion Data Systems Inc. 68040 accelerator cards, we put them through a variety of tests. Most importantly, we plugged each of them into the same IIci, using the same disk, monitor, RAM and other hardware. We ran literally dozens of applications for extended periods of time on both boards. The applications we tested include Adobe Photoshop, Illustrator, Dimensions and Premiere; Alias Research Inc.'s Sketch!; Visual Information Development Inc.'s Presenter Professional; Electric Image Inc.'s Electric Image Animation System; Pixar's ShowPlace and Typestry; Passport Designs Inc.'s Passport Producer; Macromedia Inc.'s Director and MacroModel; Microsoft Excel and Word; and Claris Corp.'s FileMaker Pro. (There were too many others, used at random, to list.) In all cases, we ran System 7.1 and the most current release of the test software. We also ran a host of system extensions, such as Fifth Generation Systems Inc.'s Suitcase and Adobe Type Manager.

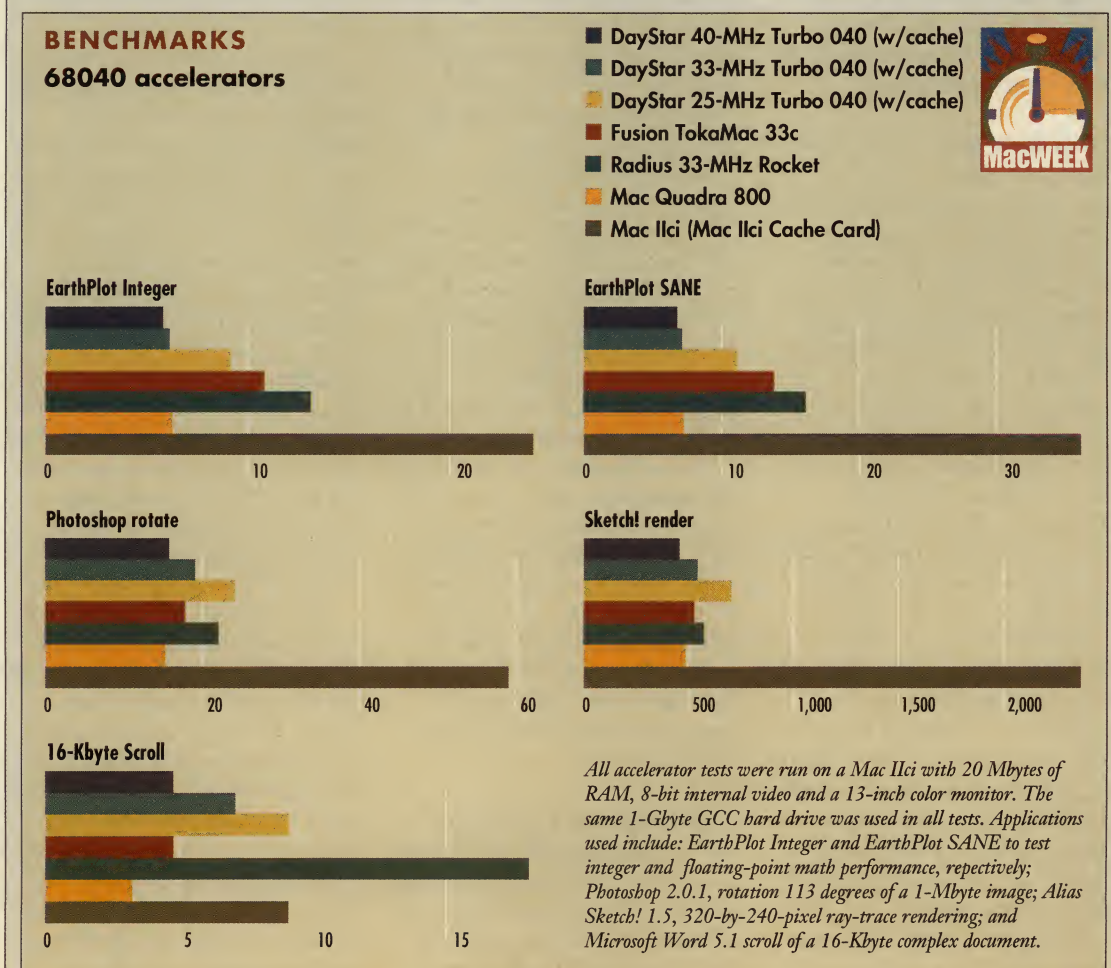
Our benchmarks included a number of our standard benchmark applications, as well as rotating an image in Photoshop and ray tracing a complex image in Sketch!. We repeated these tests on the Quadra 800 and Mac IIci to determine comparison figures.

What surprised us more than anything else about this review was that as long as we had the most current version of the software, we failed to produce a single repeatable crash. In the few cases where crashes occurred, it was directly attributable to lingering '040 incompatibilities and not to the accelerators themselves. A few extensions, such as Apple's A/ROSE (Apple Real-time Operating System Executive), appear to conflict with the '040s, but we found no compelling reason to install A/ROSE. so it wasn't an issue.

Fusion included a compatibility list, but it listed very few problems, and we didn't find any evidence to contradict it.

This glowing compatibility report is in sharp contrast to the review we gave Radius Inc.'s Rocket in 1991, which found a long list of conflicts. It's a testimonial to the software industry and the accelerator builders that everything worked as well as it did.

— By Sean Wagstaff



All accelerator tests were run on a Mac IIci with 20 Mbytes of RAM, 8-bit internal video and a 13-inch color monitor. The same 1-Gbyte GCC hard drive was used in all tests. Applications used include: EarthPlot Integer and EarthPlot SANE to test integer and floating-point math performance, repectively; Photoshop 2.0.1, rotation 113 degrees of a 1-Mbyte image; Alias Sketch! 1.5, 320-by-240-pixel ray-trace rendering; and Microsoft Word 5.1 scroll of a 16-Kbyte complex document.

'040s

From previous page

Photoshop, which makes frequent visits to the hard disk, exhibited slightly faster performance on the Quadra 800 than even the 40-MHz Turbo 040, even though that board was faster in other tests. In addition, our Word document scroll and EarthPlot tests, which are QuickDraw-intensive, were significantly faster on the Quadra 800.

The performance of the optional caches is another interesting matter. In most of our tests we experienced 20 percent to 90 percent performance boosts over the '040 board alone when using DayStar's optional cache card. Given that Fusion's board with cache was equal to DayStar's with cache, we would expect that Fusion's no-cache board (which we did not test) will experience a corresponding performance difference. For the low additional price of the cache options, we think they are a much easier decision than the '040 boards themselves.

Toeing the line. The TokaMac, with two notable exceptions, was extremely easy to install in a Mac IIci: We simply opened the Mac and plugged the board into the PDS slot. A control panel is installed in the System folder and the Mac is restarted. All of this would have been painless in our case, except that when we restarted, we got a message informing us, "TokaMac requires more memory when using internal video: Please make sure you put at least 1 Mbyte into the second set of SIMM slots." Indeed, supplementing our 16 Mbytes of RAM with four 1-Mbyte chips eliminated that problem and introduced a new one: The control panel, required to use the new '040, wouldn't load.

Investigation, including pulling all non-necessary extensions and control panels from the System folder and reinstalling the board and the extra RAM, still failed to produce a fast Mac. The manual didn't address this issue entirely. Fusion's technical-support personnel quickly narrowed the possibilities to an outdated driver on our start-up disk, but switching boot drives also failed, even though we switched to a 2-week-old hard disk from GCC Technologies Inc. At that point, we were presented with the unpleasant prospect that we might need to reformat our hard drives with a current drive formatter. As it turned out, updating all three of our attached drives with the latest version of Casa Blanca Works' Drive 7 solved the problem. This was a fairly painless solution, but it wasn't an easy one to come by. If this is a requirement for many users, we hope Fusion will work out a suitable fix or software bundle to handle it. The company said it is working on the drive-incompatibility problem, something we haven't seen with either the DayStar board or Quadras.

Fusion said a new version of the TokaMac software, due soon, would fix the empty-RAM-bank requirement and possibly address the drive issue.

Once the board was fired up, running applications was, as one would hope, uneventful. Our Mac IIci clearly showed substantial performance gains, clipping through our performance tests (see benchmarks, previous page), but otherwise, the difference in operation was happily transparent.

The only important software incompatibilities we found were a lack of support for Apple's virtual memory and A/UX.

Although Fusion shipped a list of incompatibilities with the board, in our testing of other applications we didn't find any. We had fully compatible versions of our entire suite of software. Unlike most surprises in hardware testing, this one was extremely pleasant.

The TokaMac control panel allows you to turn on and off the '040's caches. When turned off, the board should be compatible with any older applications, but the Mac will run at original speeds.

We did try running in '030 mode, set via the TokaMac control panel, and the Mac slowed as expected. A second control panel, Fusion Access, will kick the '040 into slow '030 mode if a program being launched matches one on the control panel's list of problem programs. Applications can be added to and removed from this list. DayStar has a similar feature integrated with its cache switch in the QuadControl control panel.

Star for a day. Unlike Fusion, DayStar steadfastly denies that there are any incompatibilities with its board (with the exception of A/UX) and did not ship an '040 compatibility list. Like other '040s, however, some older applications just won't work without running in '030 mode, easily set from DayStar's single control panel.

Installing the Turbo 040 and FastCache requires plugging in the cache card to the Turbo 040's daughterboard slot then plugging the main board into the PDS. This is an extremely simple installation, and unlike the Fusion installation, we didn't hit any snags. In fact, DayStar's software is the same for its various '040 models, and we swapped 25-, 33- and 40-MHz versions in and out of our Mac without reconfiguring the system (the '040-MHz board was a beta version). All worked without a hitch. The FastCache Turbo card is also identical for the various models.

We received the Mac IIsi adapter for the Turbo '040 during our testing, but it arrived too late to be included in our benchmarks. We did, however, run our benchmarks on the 25-MHz and 40-MHz beta versions as well as the 33-MHz board.

The Turbo 040's software has the capability of enabling or disabling the cache on the daughterboard, and DayStar claims the capability to disable high-speed memory locking, although we did not test this feature. DayStar said this is an issue only when using BusMaster cards or A/ROSE (Apple Real-time Operating System Executive) extension.

Although DayStar shares Fusion's incompatibility with A/UX, it does support Apple's virtual memory. While virtual memory itself is of limited value to the types of users that need '040s, the fact that DayStar has implemented its software at a level low enough to support this feature indicates a high level of overall compatibility.

The one dark spot on DayStar's side was a call we got from a user who experienced crashes of a large number of Quantum disk drives installed in his company's computers. DayStar has confirmed that a serious conflict with Quantum 170-Mbyte drives with ROM version 478 S can lead to disk crashes, but Quantum will upgrade the ROMs of the drive for free, DayStar said.

Conclusions. If you already own a compatible Mac, the Fusion and DayStar '040 boards are an easy purchase. For less than the price of a Centris 610, you can upgrade a IIci to Quadra 950 performance levels, and we anticipate even better performance from the 40-MHz versions of the boards when they become widely available. In addition to higher performance, users can expect compatibility with existing NuBus hardware.

On the other hand, if absolute peak performance, compatibility with A/UX or Apple support are mandatory, the Quadra 950 and Quadra 800 have the edge.

Memory is a two-way street in this bargain. The '040 accelerators will let you keep your current RAM; moving up to one of Apple's new '040s requires investing in new memory chips. On the other hand, Apple's new RAM implementation, which allows you to add SIMMs one at a time, is a nice touch. The Quadras and Centris 650 also offer Ethernet; fast SCSI; and high-resolution, on-board video. If your Mac is already loaded with RAM, video and Ethernet, one of these accelerators seems like a go-ahead decision, but if you're looking to expand your horizons as well as boost your processing power, Apple's Macs may be a better buy.

We think DayStar's broad availability, universal-card design and compatibility edge make the Turbo 040s a slightly better buy than Fusion boards. In addition, we like the optional cache, which lets users ease into the purchase, although we think most users should buy the cache anyway. While both boards offer impressive performance and either one represents an outstanding value, we think DayStar's product in particular is excellent in design and execution. □

Radius' Rocket gets a boost

When we last reviewed Radius Inc.'s Rocket accelerator (see MacWEEK, June 25, 1991), we found a host of incompatibilities, many related to the 68040, some not. In general, we felt the Rocket wasn't a very good buy. In looking at the new crop of '040s that use the Mac's processor direct slot, we decided to also take a second glance at Radius' 33-MHz, NuBus-based offering.

Happily, we found that many of the compatibility problems are gone. The Rocket seemed nearly as compatible as the other '040s. Unfortunately, the Rocket's NuBus base means that its performance is not as good as the PDS-based accelerators (see benchmarks, previous page).

Like Fusion Data Systems Inc.'s TokaMac board, the Rocket doesn't support A/UX or virtual memory. There are also a number of quirky incompatibilities with the Rocket and other NuBus hardware, particularly video cards and QuickTime digitizers.

As a stand-alone accelerator, the Rocket leaves something to be desired, even though its price is comparable to the Fusion and DayStar boards. One intriguing aspect of the Rocket, however, is an on-board connector that allows you to expand your Rocket in ways that the PDS accelerators cannot. The only expansion card now available for the Rocket is the SCSI-2 booster, which allows you to connect a SCSI-2 drive directly to the Rocket. It is reasonable to expect, however, that Radius will offer additional cards, such as a digital signal processor, in the future.

We also tested the Rocket extensively with Radius' $499 add-on software, RocketShare, and found that this configuration gives the Rocket a legitimate reason for being, letting you run your Rocket as a second '040 Mac inside your existing Mac. (We plan to print the results of our RocketShare testing in an upcoming issue.)

With a single menu selection, you can choose between your native CPU and the Rocket. This allows one application to be processing without interference in the background, while you work in a second application on your other "Mac" in the foreground.

You can even perform file sharing and exotic network tasks such as distributed 3-D rendering over the NuBus AppleTalk network. Users can even add multiple Rockets to a single Mac, although Radius far exceeds Apple's NuBus power specifications for a single NuBus card. We were even able to run RocketShare on Macs equipped with Fusion's TokaMac and DayStar's Turbo 040.

In addition to the Rocket's quirks, RocketShare does have some significant compatibility problems, but for those with the dedication to weed out the bugs, the software can lend a new level of productivity, particularly for graphics users engaged in a game of hurry up and wait.

We think the people who will benefit most from the Rocket are those who can make good use of RocketShare. Those more concerned with sheer speed and compatibility are better off with one of the PDS '040 boards.

— By Sean Wagstaff

Product Info

DAYSTAR DIGITAL INC.
40-MHz Turbo 040 (with FastCache Turbo): $2,399
33-MHz Turbo 040 (no cache): $1,599
25-MHz Turbo 040 (no cache): $1,299
FastCache Turbo: $199
Adapter IIsi (required to use Turbo 040 in a Mac IIsi): $49
5556 Atlanta Highway, Flowery Branch, Ga. 35042
Phone (404) 967-2077 or (800) 962-2077
Fax (404) 967-3018

FUSION DATA SYSTEMS INC.
TokaMac 33c (with cache): $1,895
TokaMac 33 (no cache): $1,595
TokaMac ci 25i (no cache or floating-point unit): $945
TokaMac ci 25 (with FPU, but no cache): $1,295
030 PDS Adapter (required to use TokaMac in a Mac IIsi): $90
8920 Business Park Drive, Suite 350, Austin, Texas 78759
Phone (512) 338-5325 or (800) 285-8313
Fax (512) 338-1276

RADIUS INC.
Rocket 33: $1,799
Rocket 25: $1,199
RocketShare: $499
SCSI-2 Booster: $299
1710 Fortune Drive, San Jose, Calif. 95131
Phone (408) 434-1010
Fax (800) 966-7360

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Comparison

Azimuth, Geocart add perspective to map projection, Mac drawing

Well-rounded apps create detailed maps

By G. Donald Bain

Until recently, custom base-map projection required a mainframe computer. The alternatives involved either tedious calculations in spherical trigonometry (and more art than science in the actual drawing) or finding an existing paper map and tracing it (often skirting the issue of copyright infringement).

The Macintosh, however, has increasingly become the tool of choice in the field of map making, or cartography. Now two programs created by professional cartographers, Graphsoft Inc.'s Azimuth and Terra Data Inc.'s Geocart, are available for map projection and base-map creation. Both of these programs let you create a highly accurate and detailed custom base map in minutes.

Geocart. When you open the $499 Geocart program, it immediately begins drawing a world map, using its very detailed database of coastline data.

Six menus offer a total of 109 projection schemes. As soon as you choose a scheme, the map is redrawn, using the new projection's default parameters.

The Recenter command lets you change the center of the map, often with surprising results, while the Boundaries command narrows the view to any North-South/East-West rectangular area. Both the Recenter and Boundaries dialogs use simple click-and-drag options on a world map.

You can open and add a variety of databases to the map, including ones describing rivers, lakes, cities (as point locations) and various levels of political boundaries (national, provincial, state and even county). The graticule (grid of latitude and longitude lines) can be configured and shown, and the nominal scale can be changed, effectively zooming in or out.

Command performance. With just these simple commands, maps of amazing sophistication can be drawn. The completeness and attention to detail in this program is really impressive — such subtleties as interruption schemes and meridian pruning near the poles are automatic. There are plenty of special commands: You can draw rhumb and great circles lines, choose from 11 standard ellipsoids (formal descriptions of a slightly non-spherical earth) or describe your own (which could be another planet), draw Tissot indicatrix on the map (small circles used to gauge distortion), or compile a statistical analysis of distortion. Certain projections have special parameters, all of which can be adjusted.

Considering the amount of calculation involved in any map projection, Geocart's performance is phenomenal. On even a medium-capability Mac (floating-point unit required), Geocart is fast enough to encourage you to experiment — an ideal way to learn about the properties of map projections as well as to find the perfect view of any area for a mapping project.

In addition, Geocart can process in the background; maps are drawn steadily even when menus are pulled down or dialog boxes are open.

Breaking new ground. As if its projection capabilities weren't enough, Geocart breaks new ground in printing and exporting base maps. Since the maps are drawn from databases of point locations, all of their lines consist of short, straight segments. If these were exported to a drawing program, they would not only overload it with unneeded detail (many points must be used to describe curves), but the crudity of the lines would show when printed at high resolutions. In both the printing and export dialogs, Geocart lets you set an output resolution; the lines are then constructed with just enough detail for that scale of output. When you export the file to an illustration program, such as Aldus FreeHand or Adobe Illustrator (in Illustrator 1.1 format), you can also convert the polylines to Bezier curves, which are smoother, easier to edit and more efficient.

Azimuth includes a full-featured CAD-like map-drawing environment as well as the capability to create many map projections. Unlike Geocart's maps, regions can be directly filled with color and may include identifying text.

Geocart's output suffers from two defects: There is no identifying text, and you cannot create fillable polygons. To create a choropleth map (one where areas are filled with colors or patterns), you must laboriously assemble closed paths out of Geocart's separate boundary segments. While this may not be too bad for two or three areas, it becomes a major task for, say, the 253 counties of Texas.

The program's intuitive design makes it easy to use, although some dialogs are confusing, notably setting resolution during print and export, and loading databases. Families of projections (such as the nine Strebe projections) are accessed through dialogs; hierarchical menus would be better.

Documentation. The Geocart manual covers it all: There's a tutorial, a full reference, descriptions of each projection, an extremely useful guide to choosing projections for various purposes, 15 informative examples of how a map would be made for a specific project, and an appendix on using Geocart with illustration programs. Geocart also comes with two very serious reference works, Introduction to Map Projections and An Album of Map Projections, providing enough information to teach a college-level course in map projection.

Azimuth. Although Azimuth's most distinctive feature is its capability to project maps, it is basically a two-dimensional CAD program. While Geocart simply prepares maps for printing and export, the $395 Azimuth provides a complete map-drawing environment.

Azimuth offers nine projections, all with fully editable parameters. Although this may seem paltry com-

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score card

Map-making software

Two map-making programs provide map-projection and base-map-creation capabilities for professional cartographers. Both impressive programs allow you to create highly accurate and detailed custom maps.

▶ **Azimuth** from Graphsoft Inc. provides an environment for professional cartography within a CAD-like drawing program. It provides most of the important map projections and includes accurate base maps at a variety of resolutions. Its maps have polygons that can be filled and may include identifying text. By starting with Azimuth's projection options and CAD tools, then exporting to a PostScript illustration program such as Aldus FreeHand or Adobe Illustrator, cartographers can have the best of both worlds.

▶ **Geocart** from Terra Data Inc. is an outstanding program for learning about map projections and creating base maps. It comes with an excellent worldwide geographic data set, reads text files of geographic data, supports more than 100 projections, allows complete control over projection parameters and even provides analytic tools. Best of all, it can export maps to illustration programs as Bezier curves, and it lets you specify the level of output detail.

	Azimuth	Geocart
Overall value	◆◆◆◆	◆◆◆◆◆
Version tested	2.1	1.3.1
Price	$395*	$499
Performance	◆◆◆◆◆	◆◆◆◆◆
Ease of use	◆◆◆	◆◆◆◆
Features	◆◆◆◆◆	◆◆◆◆◆
Documentation/support	◆◆◆◆	◆◆◆◆◆

**Five- and 30-user packs available for $900 and $1,400, respectively. Upgrades from Version 1 are $45; upgrades from Version 2.0 are free.*

Mapping out the projection

The question of how to best portray the spherical surface of the earth on a flat map is as old as scientific map making. Some projections in use are more than 2,000 years old, and the ubiquitous Mercator projection dates from 1569. Yet, the problem is so intriguing that new projections have been created steadily over the centuries. The use of computers has accelerated the process enormously — in fact, 11 of the projections offered in Terra Data Inc.'s Geocart were developed by its author.

All projections produce distortion of two kinds: inequalities of scale on different parts of the map and changes in the shape of objects. Projections are usually judged on how well they deal with these two variables: A map that produces little distortion of shapes is said to be conformal, while one that minimizes variations in scale is referred to as equal area. Most of the widely used projections strike a balance between the two, but specialized projections are valuable for minimizing distortion of just one kind or in one area, or providing a unique view of the world. — By G. Donald Bain

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Mapping

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pared with Geocart's 109, these are the ones most likely to be used for serious mapping (compared with studying the science of projection or producing novelty maps such as the projection modeled on the Apple logo — one of the more esoteric projections included with Geocart). However, the Robinson projection, which is used by Rand McNally & Co. and the National Geographic Society, is notably absent. Projection controls are simple but adequate, and they are all contained in one straightforward dialog box.

When you open Azimuth, there is no map — just a page and a set of drawing tools. A base map file is opened (several are provided, and you can also use simple text files of latitude/longitude data), and it is displayed in a special layer, unprojected. You can select part or all of the base map, set the projection type and parameters, and a map will be projected and drawn to a new layer. You can repeat this procedure to create more than one map on a page. Lines drawn on the base map will be projected as great circles.

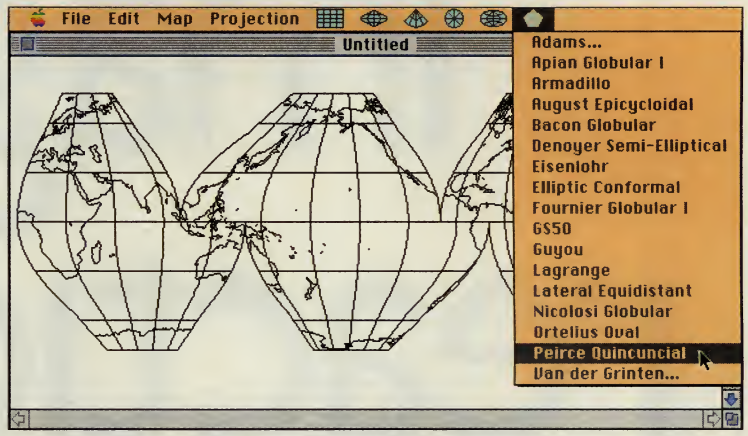
Power tools. The real strength of Azimuth appears once the projected map has been created. Drawing tools, based on Graphsoft's CAD program Blueprint, let you add lines, fills, symbols and text. The tools are powerful and flexible; for example, ovals can be drawn by radius, diameter or clicking three points; free-form curving lines can be polylines, cubic splines or Bezier curves. A whole palette of alignment and constraint settings allows accurate drawing. Symbols can be created and loaded as libraries. There are multiple layers that can be named and then shown, hidden or grayed. Scale can be in real-world dimensions (miles, kilometers), at a specified fractional scale or in paper coordinates (centimeters, inches). Different layers may have different scales.

Unlike Geocart's maps, Azimuth's contain closed shapes that can be filled with a color or pattern. Also, the full resolution of the source map is preserved, no matter what the projected map's size. All objects can be edited, grouped, moved between layers, resized and rotated. The commands Clip, Trim and Intersect are especially useful.

Despite the power of these graphics tools, relatively few professional cartographers will want to be restricted to them. Since map making is currently done mostly with illustration software (primarily FreeHand and Illustrator but also Deneba Software Inc.'s Canvas and Claris Corp.'s MacDraw), CAD-style tools are unfamiliar to many cartographers. Some CAD tools, such as Fillet, Hatch and Mitre, will seldom be used in map drawing. Most importantly, CAD-based control over lines, fills, colors and text is less sophisticated than in the PostScript-oriented illustration programs. The wealth of the CAD environment also translates into complexity — beginners will find the learning curve daunting. Only 20 percent of the Azimuth manual deals with maps; the rest discusses CAD.

Azimuth maps can be exported as DXF (Drawing Interchange File), widely used in CAD; PICT; or Encapsulated PostScript files. Most users, though, will simply copy and paste to their favorite drawing program. Although this preserves fillable shapes, there is no option to convert to Bezier curves, and classes of objects are not grouped to aid in setting up layers.

Azimuth is a fast, smooth program that will run on any Mac model from the Mac Plus up. The program's ease of use for map making is compromised by its complexity, and a few important procedures, notably setting the scale and working with layers, can be confusing. Some important steps are not intuitive, such as the necessity of converting an arc to a line before it can be trimmed. And it is dangerously easy to inadvertently save changes to the source map instead of creating a new map.



Both Geocart and Azimuth offer a wide array of projection options. This pull-down menu shows a small sample of the possibilities in Geocart.

Documentation. The Azimuth manual is complete but marred by a bad index. The special map subjects are covered well, if rather briefly. Unfortunately, there is no on-line help of any kind; balloon help would be especially welcome for those unfamiliar with all the tools and constraint settings.

Conclusions. Azimuth and Geocart are both very impressive programs designed to meet the needs of professional cartographers. Azimuth is a stand-alone map-drawing environment, providing everything needed: base-map data, most of the important projections and a full set of drawing tools. The program, however, is not easy to use, and the CAD-style drawing tools fall short of those in PostScript illustration programs. Most users will want to take advantage of some of Azimuth's features, such as Trim and Intersect, then move the map over to an illustration program to finish it.

Geocart is a more specialized program, focusing on creating projected maps and exporting them. The number of projections and controllable parameters is truly staggering. Every aspect of the process is treated thoroughly and with great attention to detail, yet the program is easy to use; in fact, it's fun to play with. The capability to export base maps that were created as polylines into illustration programs as Bezier curves is truly a breakthrough. The lack of fillable shapes and identifying text, though, can sometimes create problems.

Map makers who want an all-in-one package, need fillable polygons or prefer a CAD-type drawing environment will go for Azimuth. Professional cartographers may choose Geocart for its ease of use and powerful projection capabilities, and because it allows them to finish maps in their preferred illustration program. Graphic artists and others who have an occasional need for custom projections may find Geocart easiest to handle. And educators will prefer Geocart because of its extensive documentation and analytical features, and because it encourages experimentation. Every college geography department should have a copy of Geocart running on a fast Mac. □

Master cartographers craft their own map-making tools

In his 12 years as a cartographer at the National Geographic Society, Richard Furno, author of Graphsoft Inc.'s Azimuth, drew plenty of maps without computer assistance. Fourteen years ago he moved to The Washington Post. "They realized that well over half of the graphics they were publishing were maps, but many of them were just not good enough because they had been created by artists, not cartographers," Furno said. At the Post, he has produced countless maps, at first completely by hand, now almost entirely on the computer.

Furno bought one of the first microcomputers, a TRS-80, taught himself programming and, in 1981, wrote his first map-projection program. He began to use it professionally at the Post on an IBM PC, but when the Macintosh appeared on the market he knew it had to be ported again. In 1988, he and Richard Diehl, founder of Graphsoft, created the original Azimuth program. Diehl provided the drawing environment (a precursor of the CAD program MiniCAD), and Furno wrote the mapping module.

Now Furno uses his own product in his day-to-day mapping for the Post. He starts with Azimuth, creating a properly projected base map, then uses its drawing tools to add new features, clip the map and fill polygons. The graphic is moved to Aldus FreeHand, "the Post's standard graphics program," using copy and paste functions.

Where next for Azimuth? Furno would like to make more-detailed base maps available in Azimuth format. He hopes to bring out the Digital Chart of the World (with a nominal scale of one to 1 million) on a series of CD-ROMs by the end of the year. But the big challenge, he said, is to provide some assistance to illustrators with little cartographic experience. "Now that we have given them all these great map-making tools," he said, "we have to help them make good maps with them."

Terra Data Inc.'s Geocart is marketed by Paul Pugliese, another cartographer whose work is seen by millions. As chief cartographer for Time magazine, he has produced more than 1,000 maps for the publication in the past eight years and for hundreds of books as well. Joe Lertola, associate graphics director at Time, works with Pugliese on maps but also uses computer graphics to produce some of Time's striking illustrations. Two years ago Pugliese and Lertola, recognizing the potential for an accurate base-map-creation program on the Mac, teamed up with Daniel Strebe, a programmer Pugliese said has an "obsession with map projections." Strebe not only crafted a landmark piece of geographic programming but added 11 original projections of his own.

Now most of Time's mapping projects start with a base map created in Geocart. The maps are finished in Adobe Illustrator, sometimes going through an intermediate stage in Adobe Dimensions, a program that turns two-dimensional drawings into three-dimensional objects. Geocart is marketed out of Pugliese's home in Croton-on-Hudson, N.Y. Like Furno, Pugliese has plans to bring out detailed base-map data on CD-ROM, probably beginning with the Digital Chart of the World.

It is perhaps no coincidence that two brilliant desktop mapping programs should appear just as the world map goes through a period of massive changes. Both programs include a united Germany and the successor states to the Soviet Union, Czechoslovakia and Yugoslavia. Furno's latest job was to carve newly sovereign Eritraea out of Ethiopia, a task that took him a mere 20 minutes — using Azimuth, naturally. — By G. Donald Bain

Product Info

GRAPHSOFT INC.
Azimuth Version 2.1: $395;
site licenses: five- and 30-user packs available for $900 and $1,400, respectively
Upgrades: $45 from Version 1 and free from Version 2.0
10270 Old Columbia Road, Suite 100, Columbia, Md. 21046
Phone (410) 290-5114
Fax (410) 290-8050

TERRA DATA INC.
Geocart Version 1.3.1: $499 (site license available)
Additional copies: $100 for second and subsequent copies (under control of a single person)
Bramblebush, Croton-on-Hudson, N.Y. 10560
Phone and fax: (212) 675-2971

SYSTEM 7 COMPATIBILITY

Map-making software	Geocart	Azimuth
Balloon help	No	No
TrueType	n/a	Yes
Publish and subscribe	No	No
Apple events	No	No
32-bit addressing*	Yes	Yes

**According to vendor.*

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PC Week 1/25/93 by Herb Bethoney

Scoreboard Overall score 4.4

MacWEEK

"....4D 3.0 is a superb environment for database development. It empowers you with the ability to produce efficient, truly elegant Mac applications....ACI has done an excellent job of integrating new features while retaining an interface familiar to many users. New users will find it easy to get started...ACI's support system is topnotch....The time-sliced multi-tasking capability added in version 3.0 greatly enhances the designer's options and speeds development time..."

MacWeek 12/14/92 by Mel Male

Scorecard Overall value ◆◆◆◆◆

MACWORLD

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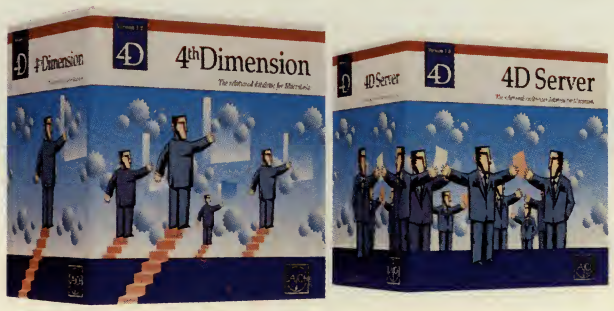
Macworld 4/93 by Charles Seiter

MW ★★★★



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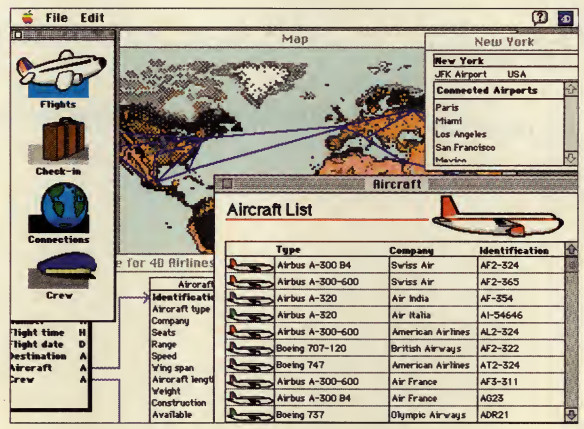

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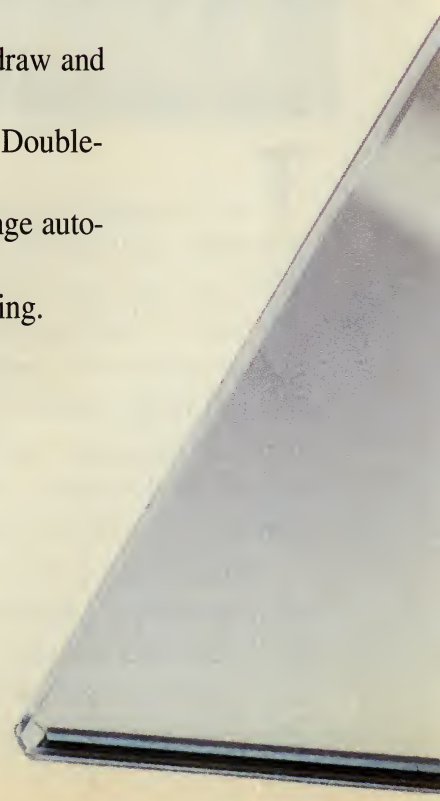

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PRODUCT WATCH

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Porting MIDI to the world of corporate presentations

Low- and medium-priced devices are making MIDI music technology viable for corporate presenters.

By Larry Stevens

Corporate meetings require a bit more sizzle now than they used to. It's becoming more common to see computer-based presentations with some music to help keep viewers awake and interested.

"When done with taste, music in a presentation drives home the presentation's point on both the conscious and subconscious levels," said Chris Bosshardt, a MIDI (Musical Instrument Digital Interface) consultant based in Santa Monica, Calif. "It can add excitement, sophistication, humor and power."

Music options. There are three ways to add music to a Mac-based presentation: either using MIDI hardware and software or digitized audio files (also called sampled sounds), or triggering the playback of an audio CD during your presentation. Each of these has its pros and cons.

Eight-bit digitized audio is easy to use and inexpensive, but its quality is not very good. You can use third-party hardware and software to boost the audio output to 16-bit CD quality, but the requisite equipment is expensive, and it takes a heavy toll on disk space and RAM.

Triggering CDs using a CD-ROM drive limits you to the length and tempo of prerecorded music, which may not fit every type of show.

MIDI, on the other hand, offers excellent quality sound, requires only reasonably priced equipment and doesn't hog computer resources. For those reasons, many users have found that MIDI music is an excellent choice for many corporate presentations.

To use MIDI, you'll need to buy and become familiar with several different types of hardware and software. Here's a guide to sorting through the bewildering variety of options available.

MIDI hardware. According to users, you can spend tens of thousands of dollars on a MIDI system, which can include controllers, synthesizers, drum machines, sound modules and MIDI control (see story, at right).

However, for corporate presentations, a basic but complete MIDI system needs just a MIDI interface box, a synthesizer or a sound module to play back the MIDI file, and an amplifier with speakers to hear the output of the synthesizer.

The MIDI interface box converts the data coming from your Mac's serial port into a format that can be carried by MIDI cables to MIDI devices, and vice versa. The primary factor in the cost of MIDI interfaces is the number of MIDI inputs and outputs they have.

At the low end, Opcode Systems Inc.'s MIDI Translator II provides one MIDI-in and three MIDI-out ports for $69.95. For professional musicians with dozens of MIDI instruments, Opcode's $995 Studio 5 has 15 in and 15 out channels. Some high-end MIDI interface boxes allow you to merge MIDI music. For example, both Opcode's Studio interfaces and the MIDI Time Piece II from Mark of the Unicorn Inc. can merge, synchronize and process MIDI signals.

MIDI sound modules. A sound module is a synthesizer without a keyboard that is used for playback only.

The need to carry around extra equipment such as a synthesizer is one of the main reasons some corporate presenters have shied away from MIDI. However, falling prices and weights of MIDI sound modules and synthesizers is making this technology more accessible than ever.

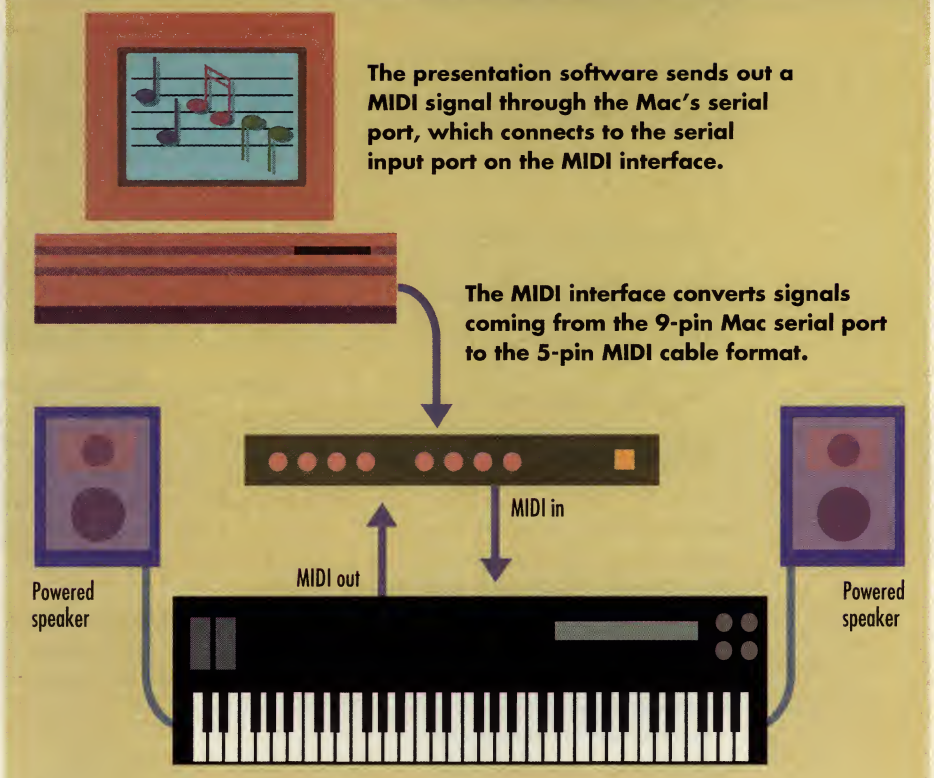
For example, in October, Yamaha Corp. of America announced the TG100 Tone Generator, a portable MIDI sound module that sells for less than $500 and has 192 acoustic and electronic instruments plus special effects and drum sounds that can be played individually or in groups of 16 at a time. It is about the size of a removable car stereo, weighs 2 pounds and includes a built-in MIDI interface.

Roland Corp. US' Sound Canvas, which includes 128 instrument sounds and six drum sets, is less than 4 pounds.

E-mu Systems Inc.'s Proteus

See MIDI, next page

How a MIDI system works within a presentation



The keyboard accepts MIDI signals from the Mac via the MIDI-in port and sends signals to the Mac sequencer program via the MIDI-out port. The synthesizer's sound is played back through powered speakers or a sound system with a separate audio amplifier.

NEVIN BERGER

Going the digital audio route: How well does it travel vs. MIDI?

Although digital audio eliminates the need for MIDI devices, it will take a toll on your RAM and hard drive.

By Larry Stevens

If MIDI is, in essence, a score containing instructions on how to play a piece of music, digital audio is the recording of the music itself. At best, a sampled sound can play back nearly ever nuance of the original sound.

However, digital audio takes a much larger toll on your hard drive than MIDI (Musical Instrument Digital Interface) music files. One minute of eight-bit 22-kHz sound (the standard digital audio resolution used within the Mac for beep sounds) uses about 1.2 Mbytes, while a minute of 16-bit CD-quality monophonic sound takes up about 5 Mbytes.

Stereo, 16-bit CD-quality samples use 10 Mbytes per minute. By contrast, one minute of stereo MIDI music uses only about 50 Kbytes. Digital audio also cannot be edited as fully as MIDI files.

Still, simple eight-bit digital audio files can be played back using no other equipment than a Mac and its internal speaker.

Eight-bit digital audio. The easiest and least expensive way to digitize music or other sounds for presentations is to use the built-in recording and playback circuitry of the Mac, as well as simple tools such as MacRecorder from Macromedia Inc.

However, for most musical pieces, other than very simple and short attention-getting bars, the relatively low sample rate and resolution of eight-bit audio provide relatively poor sound quality.

SoundEdit Pro from Macromedia and Audioshop from Opcode Systems Inc. both work with eight-bit audio files. Both products allow you to cut and paste sounds, combine sounds from different tracks, and add special effects such as echoes or reversing sounds.

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MIDI

From previous page

series has a number of modules for less than $1,000 that can play back a variety of 16-bit audio instrument samples. However, unlike the Roland or Yamaha units, the Proteus sound modules do not include built-in reverb to create fuller sounds.

However, one of the advantages of E-mu system equipment, according to Frank Serafine, owner

> According to users, Opcode's EZ Music Starter Kit is a good bundle with which to begin using MIDI.

of film and video sound effects production house The Serafine Creative Complex of Venice Beach, Calif., is that many complex features can be precisely controlled from his computer rather than the device's front panel.

Serafine said his work is a lot more efficient when he can play back and control his sound modules without having to leave his computer screen and play around with knobs and dials.

Whether you buy a MIDI synthesizer or sound module, experts said you should buy one that is multitimbral. A multitimbral MIDI synthesizer can play more than one sound at a time, so you could play a drum, string and piano line from just one instrument.

MIDI software. As with hardware, MIDI software varies in complexity and price. Professional musicians will often have several pieces of MIDI software, including a sequencer, notation program and librarian software, although most corporate presenters need only a sequencer.

The interface for most sequencers works like a cassette tape deck. The on-screen controls allow you to play, stop, fast forward, rewind and record.

If you click on the record button and play a MIDI synthesizer or MIDI controller, the software will capture the incoming MIDI data from the keyboard. Clicking the play button sends the MIDI data back to the synthesizer or sound module causing it to play back the music.

You can also use a sequencer to layer and edit music. For example, once you've recorded the first performance on one of the sequencer's tracks, you can record a second, independent track. Each track can be transposed, shortened, deleted or modified as needed.

According to users, a good bundle with which to begin using MIDI is Opcode's EZ Music Starter Kit. Priced at less than $300, the EZ Music Starter kit comes with a MIDI interface, Opcode's EZ Vision sequencer and a HyperCard stack on MIDI called "The Book of MIDI."

EZ Vision is a scaled-down version of Opcode's high-end Vision sequencing program. EZ Vision lets you view and edit 16 tracks, while Vision allows you to edit up to 99 tracks. Studio Vision, the company's top-of-the-line package, allows you to combine MIDI and digital audio.

Passport Designs Inc.'s entry-level sequencer Trax includes a Track Sheet Song Editor and Step Editor windows. The company's high-end Master Tracks Pro 5 integrates track editing, automated mixing and control over MIDI instruments in a single window.

Mark of the Unicorn's $495 Performer sequencer provides four different real-time windows, while the company's high-end Digital Performer Sequencer allows you to mix digital and MIDI music.

Because MIDI has been more of a tool for professional musicians, its use in corporate presentations has not been widespread.

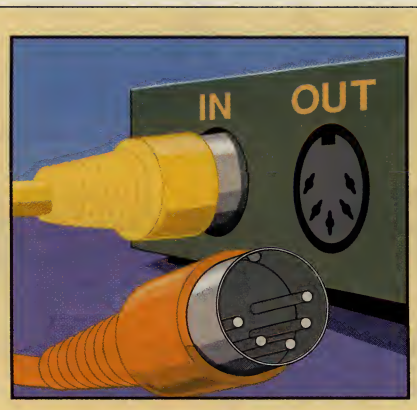
However, the ability to edit music to suit your show, make last-minute changes without having to call the composer, and to be free of the heavy storage and memory demands digital audio places on hard drives and RAM makes MIDI an attractive choice for many corporate settings. □

Erik Holsinger contributed to this article.

A glossary of MIDI hardware and software terms

- **Sequencer:** Primarily a software application that is used to record music played on MIDI devices. You can then edit the MIDI music file by removing or adding notes, changing the key or adding tracks.

- **Librarian and editor software:** Allow you to list, sort and keep track of the different sounds in your various MIDI sound modules and synthesizers. Editor software includes all the functionality of librarian programs but also enables you to edit sound parameters from your Mac.
- **Notation software:** In essence, a word processing program for musical scoring. Most notation software can also automatically create a written score out of a MIDI file that has been sequenced.
- **MIDI interface:** A box that sits between the Mac and MIDI devices. It connects the Mac via a serial port to one or more MIDI devices, and vice versa.
- **Controller:** Any device that can transmit MIDI data. All MIDI keyboards are MIDI controllers.
- **Synthesizer:** A device that generally includes a keyboard that receives MIDI instructions from the computer and plays the score. Synthesizers can also be MIDI controllers, where the keyboard is used to play music directly and send the resulting MIDI file to your Mac.



- **Drum machines:** Hardware that plays drums based on MIDI instructions. While most synthesizers include drums, drum machines offer better sound. Most machines come with built-in drum patterns.
- **Sound modules:** A device that plays back MIDI music just as synthesizers do. Unlike synthesizers, sound modules do not have a keyboard so they cannot play music directly on them. Their advantages over synthesizers are they cost and weigh less.
- **Hardware sequencer:** Dedicated devices that can be used in place of a computer-based sequencing program.

Name that tune: A definition of the MIDI standard

Musical Instrument Digital Interface is an industrywide standard that provides a common language to allow computers to communicate with all MIDI devices, including synthesizers, drum machines and traditional instruments, such as pianos that have been modified to accept MIDI signals.

MIDI music created in any program and on any computer will play the same note pitches and rhythm when transmitted to any type of synthesizer or music module.

Besides being an industry standard, there are two other advantages of MIDI, both of which result from the type of data MIDI software stores. Unlike digitized audio files, MIDI files contain only a description of the music you create, including information about what keys you hit, how hard and fast you played a musical passage, and other important information.

The difference between MIDI and digital audio is akin to the difference between PostScript and bit-mapped image files. Because they use a mathematical formula to describe the image, PostScript files require less disk space than bit-mapped image files, where information on every pixel in the image is defined. MIDI's formula approach to sound is more economical than that of digital audio, where thousands of sound samples are captured each second.

MIDI's advantage in saving disk space is dramatic. Brad Vinikow, owner of Impact Communications Group, a multimedia production company in Fountain Valley, Calif., specializing in corporate presentations, uses both MIDI and digital audio in his clients' presentations.

He often mixes them in the same presentation using Passport Producer from Passport Designs Inc. He said that while there is a place for both types of music in presentations, MIDI files "are minuscule when compared with the same music created in audio CD."

According to Vinikow, one minute of stereo digital audio usually requires about 10 Mbytes of disk space, while a similar MIDI file may require about 45 Kbytes. "The resource advantage of MIDI is clear," he said. "If hard disk space is an issue, it's virtually your only choice."

MIDI's formula approach also provides users a good deal of flexibility in altering the sound. Jeff Berger, a MIDI consultant and author of "The Desktop Multimedia Bible" from Addison-Wesley Publishing Co., said that the advantage of buying "canned" MIDI over digital audio CD is that the MIDI is much more editable.

"Say you've got a clip that's one minute long but you want a three-minute segment," Berger said. "With digital audio you can cut and paste, but you can't add volume to the melody line in the first minute or eliminate the trumpet in the second minute. With MIDI on a Mac, you can do that with a few mouse clicks." — By Larry Stevens

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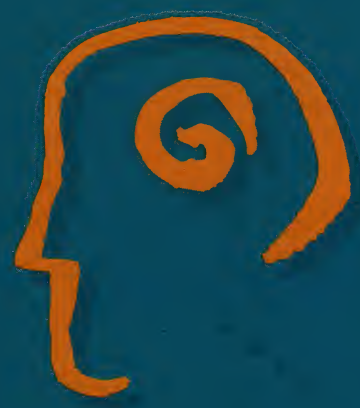

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Digital audio

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16-bit audio. Unlike eight-bit Mac sound, 16-bit digital audio provides professional-quality music and is the standard resolution used in recording CDs. However, creating, storing and playing direct-to-disk 16-bit audio requires expensive equipment and a lot of storage.

So while 16-bit audio systems allow companies to play their presentations without synthesizers or sound modules, which are needed to play MIDI music, they do require heavily loaded Macs.

Brad Vinikow, owner of Impact Communications Group of Fountain Valley, Calif., a multimedia production company specializing in corporate presentations, said that some of his clients prefer their presentations on hard drives rather than on MIDI systems. However, he makes available to them a Mac Quadra with a 1-Gbyte hard drive and 72 Mbytes of RAM.

"When you're using the hard drive basically as a tape recorder, you'll need a lot of [hard disk] space. There's no getting around it," he said. Equipment to create 16-bit audio is relatively expensive, with prices starting at $1,000 at the low end.

Digidesign Inc.'s AudioMedia LC, which runs on all Mac LCs, costs just less than $1,000, while the company's AudioMedia II, which runs on the Mac II and Quadra series and has an I/O slot for compatibility with digital audio tape recorders, is a few hundred dollars more.

The AudioMedia package, which comes bundled with Digidesign's SoundDesigner II waveform editing software, is a scaled-down version of the company's SoundTools system, which provides up to 16 tracks of digital audio recording.

Mark of the Unicorn Inc.'s Digital Waveboard is a NuBus card that provides four tracks of direct-to-disk audio recording using the company's Digital Performer software as a front end. However, this requires separate analog-to-digital converters, such as those found on a digital audio tape recorder, to be fully functional.

Because of the costs involved in creating 16-bit digital audio, professional musicians and recording engineers will use them more as digital recording systems than to create music and sound effects for presentations. And for that purpose, they do have the advantage of being plug-and-play. □

Product Info

DIGIDESIGN INC.
AudioMedia II: $1,295; **AudioMedia LC:** $995; **SoundDesigner II:** $995; **SoundTools:** $3,495 (includes SoundDesigner II)
1360 Willow Road, Suite 101, Menlo Park, Calif. 94025
Phone (415) 688-0600; fax (415) 327-0777

E-MU SYSTEMS INC.
SUBSIDIARY OF CREATIVE TECHNOLOGY INC.
Proteus 1: $595 (general MIDI version)
1600 Green Hills Road, Scotts Valley, Calif. 95066
Phone (408) 438-1921; fax (408) 438-8612

MACROMEDIA INC.
SoundEdit Pro: $295
MacRecorder Sound System Pro: $349
600 Townsend St., Suite 310 W., San Francisco, Calif. 94103
Phone (415) 252-2000; fax (415) 626-0554

MARK OF THE UNICORN INC.
Digital Waveboard: $1,495;
Performer: $495; **Digital Performer:** $695;
MIDI Time Piece II: $595
1280 Massachusetts Ave., Cambridge, Mass. 02138
Phone (617) 576-2760; fax (617) 576-3609

OPCODE SYSTEMS INC.
MIDI Translator II: $69.95; **Audioshop:** $89.95; **EZ Vision:** $99.95; **Vision:** $495; **EZ Music Starter Kit:** $299.95; **Studio + 2:** $149.95; **Studio 5:** $995; **Studio Vision:** $995
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Phone (415) 856-3333; fax (415) 856-3332

PASSPORT DESIGNS INC.
Master Tracks Pro 5: $395; **Trax:** $99; **Passport Producer:** $495
100 Stone Pine Road, Half Moon Bay, Calif. 94019
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ROLAND CORP. US
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YAMAHA CORP. OF AMERICA
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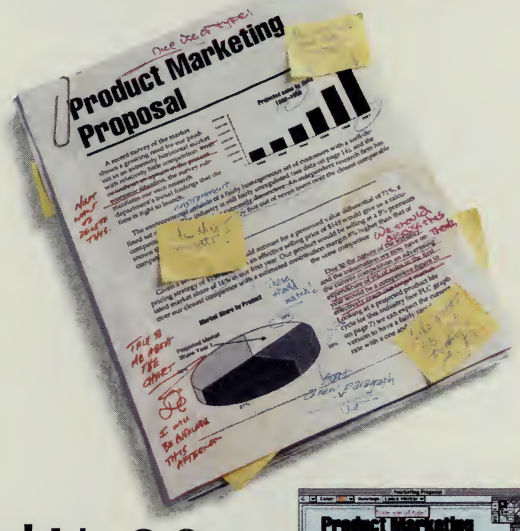

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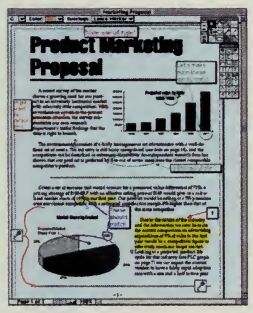

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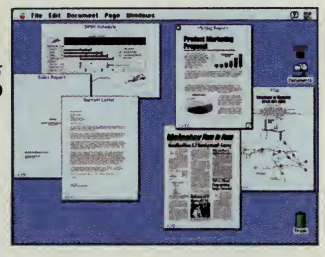

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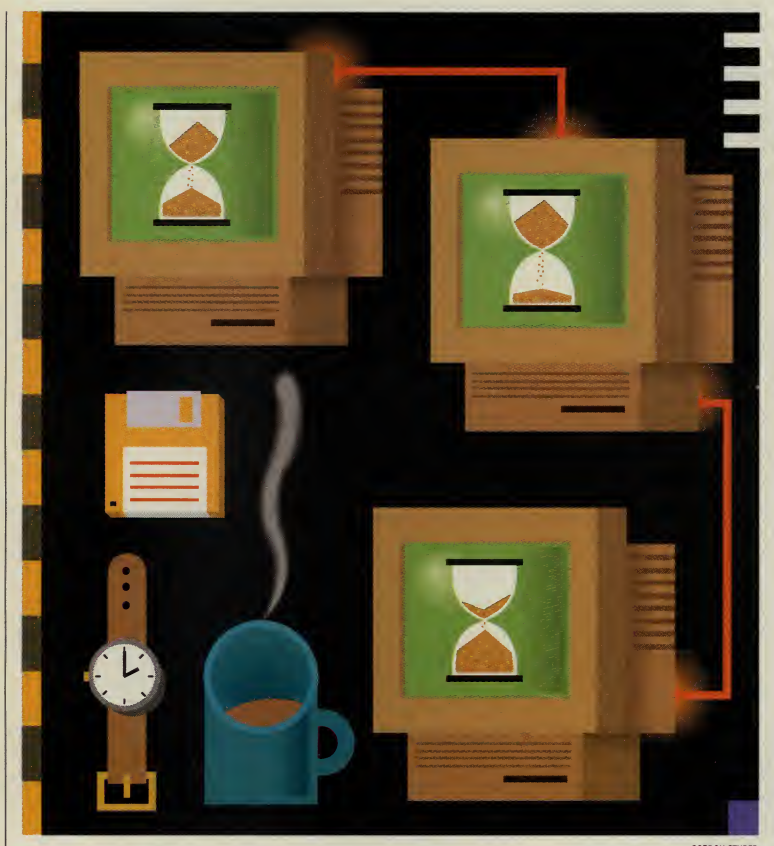

GORDON STUDER

MacInTouch RIC FORD

Finder wait states and PB power trips

We follow up on the Finder this week, examining more performance parameters, then check into the ins and outs of AC and DC power supplies for PowerBooks.

BUGS & TIPS

Finder figures. Readers wrote to point out a trap that I overlooked in the April 19 column about Finder performance factors: In certain circumstances, the Finder's "Calculate folder sizes" option (in the Views control panel) can leave people in limbo while it sifts through files and folders.

Normally, the Finder calculates folder sizes in the background when it is not busy doing something else. However, if you have chosen both View by Size and Calculate folder sizes, the Finder puts everything else on hold when you open a disk or folder window.

The Finder has to complete all its folder calculations first before it can display the list in size order. This exercise can quadruple the time it takes to open a window, and you cannot open a file or do anything else productive in the meantime.

When volumes are shared across LocalTalk, this process is even slower. The Finder piles up overhead on the network, and other people sharing volumes experience delays caused by the extra load.

The solution, of course, is simple: Turn off Calculate folder sizes, especially in networked environments, unless it is truly necessary for some reason. If you do use the option, at least avoid viewing by size to keep the delays under control.

The outer limits. Since the March 8 and April 19 columns about pushing other limits of the Finder, some details have become clearer.

Finder 7 can cope with a folder containing 1,000 files without too much trouble. The folder opens in a reasonable amount of time. You can scroll from one end to the other, and you can switch views.

Try to open a folder containing 3,000 files, however, and the Finder breaks down. A Centris 650 takes a minute just to open the window, and then the scroll bar fails to work, so only a few files are accessible. Trying to change views is an exercise in frustration.

If you try to open a file in one of these folders from within an application, the standard file dialog shows fewer than 900 files out of the total. Only the files lowest in alphabetical order are visible and accessible.

Reader Bruce Carter reported a real-world example of this problem when a rampant electronic-mail server stuck thousands of error message files into a folder with legitimate mail files.

After trying all sorts of tricks under Finder 7 to work around its problems, Carter's group finally started up from System 6.0.8 and managed to recover the good mail messages through a slow process of selecting individual files.

Laptop power tips. Several readers wrote in about the problem of blowing fuses in PowerBooks. The original AC adapter for the PowerBooks apparently has a tip whose plastic insulator is prone to breaking. When this happens, the metal conductor can contact the wrong connector in the PowerBook's socket, blowing a fuse on the motherboard.

The correspondents said that Apple has redesigned the power supply but offers no help for people who experience problems with the original adapter.

One PowerBook user noted similar reliability problems with the HDI-30 connector used for connecting to SCSI devices. In this case, the plastic between the connectors in the socket can break, leading to problems such as bent pins and short circuits.

Another change in PowerBooks is an increase in their battery capacity with the newer models. The NiCad batteries for the PowerBook 140 and 170 are rated at 2.5 amp-hours. Batteries for the 160 and 180 offer 2.8 amp-hours, and the 165c battery goes up to 2.9 amp-hours.

The lower-capacity NiCad is model M5417, the 160 and 180 use M5653, and the 165c battery is M5654.

Photoshop patch. Adobe Systems Inc. has released a patch for Photoshop 2.5 in an unusual form: a Photoshop plug-in. According to Adobe, Photoshop 2.5 sometimes produces out-of-memory errors while trying to save a file if the program has more than 20 Mbytes of RAM allocated.

The plug-in removes a tweak to the Mac operating system that caused the problem, but this may slow down menu operations slightly in large-memory configurations.

The patch is available for downloading from the Adobe Forum on CompuServe and from America Online. An automated phone system at (408) 986-6500 will record your name, address and phone number to order the patch if you answer a score of questions correctly.

Boot kick. You never know what things are going to find their way into the unused nooks and crannies of the Mac ROM. In the case of the Quadras and some PowerBooks, there is an alternative power-on sound hidden in the ROM.

BootBeep, a tiny control panel device from Robert Polic, lets you switch between this hidden power-on sound and the normal sound. Clicking on the version number displays some Apple engineers. □

Comments on MacInTouch are welcome at 7 Parmenter Ave., Maynard, Mass. 01754. Phone (508) 897-2621. Address electronic mail to RICFORD on AppleLink or MCI Mail; to 72511,44 on CompuServe; or on the Internet to 72511.44@compuserve.com. Join us on-line in the MacWEEK Forum at location ZMC:MACWEEK on CompuServe or ZiffNet/Mac.

Ask David Ramsey

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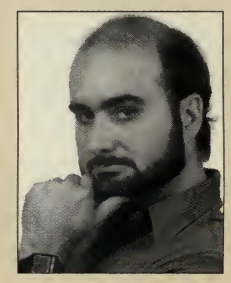

APDA redux. I've received several letters from readers complaining about APDA's service after they ordered the subscription to develop magazine that I recommended. The complaints are all the same: The credit card is charged the day the order is called in, but the magazine never shows up.

I've found similar complaints on AppleLink as well as the APDA section in the Mac Developer's Forum on CompuServe. (But since the APDA account owners last checked there in January, the CIS complaints are futile.)

In response to my electronic-mail question, APDA Manager Glen Fiance said that it had "taken advantage of the fulfillment expertise of a third party." This means that APDA doesn't handle the orders; a fulfillment house does — you know, the same kind of fulfillment house that screws up your magazine subscriptions and never sends your free mouse pad.

You can E-mail your complaints to TELL.APDA@applelink.apple.com. Include all the details — customer number, order number, etc. — APDA promises to check this account daily.

Q. There's a company advertising bulk quantities of high-density disks, but the disks are different for IBM PC and compatibles and Macs. The Mac disks cost 11 percent to 16 percent more. Is this a ploy to soak the Mac community?

A. The only thing Apple says about floppy disk media is that you must use genuine high-density disks. The SuperDrive enforces this by detecting the extra hole in the disk shells.

Judging from my personal experience as well as the volume of on-line complaints, SuperDrives — which have a well-deserved reputation for flakiness — have become more reliable only recently. They seem to perform better with some brands of disks than others, while PC drives don't seem to care.

Given this record, if I were buying disks in bulk, spending a few cents more each would seem prudent. In any case, the prices in the ad you sent me are far below what you'd pay for disks in boxes of 10.

Please send questions to David Ramsey on CompuServe: 76702,335 or to Ask David Ramsey, c/o MacWEEK, 301 Howard St., 15th Floor, San Francisco, Calif. 94105.

Script Manager

Starting up with AppleScript

STEVE MICHEL

DOS' batch files are useful, particularly the AUTOEXEC.BAT file that runs whenever DOS boots. System 7 has the Startup Items folder, and anything you place there runs automatically when the Mac starts up. But you don't get much control over that process. I wrote a small AppleScript script that runs whenever you start your Mac and refined it so that certain statements are executed only when the Mac is started the first time each day.

The persistence of properties. The first line is a property declaration for lastTimeIRan, which holds the date on which the script was last executed. Properties are variables that, in scripts that have been saved as applications, are persistent between runs of the application. That means that values in properties are saved to disk as part of the script whenever the application quits. Properties are cleared, however, whenever you edit a script and recompile it.

The next thing you see is a test of whether lastTimeIRan contains anything. If the property is empty, the script copies the current date to it and executes the runToday handler. Note that the current date is supplied by a Scripting Addition file (found in the Scripting Additions folder inside the Extensions folder).

Next, the script tests to see if the date contained in lastTimeIRan is the current date. Since AppleScript doesn't include date operations — such as adding or subtracting a year, month, day or hour — the script stores the current date in a variable called newDate.

The script must coerce the current date from AppleScript's internal date format into text format. When you do this, the current date is in the form Day, Month Date, Year Time AM/PM. For example, the date this was written was "Thursday, May 6, 1993 6:53:54 PM". The date stored in the variable lastTimeIRan also is coerced to text and stored in a variable called oldDate.

The script then compares the third word of the newDate variable, which contains the day of the month, with the third word of the oldDate variable. If they're different, the assumption is that the script hasn't been run yet today. So today's date is stored in the persistent lastTimeIRan variable, and the runToday handler is called. Otherwise, since there are no more statements within the main body of the script, the application exits.

The upshot is that statements in the runToday handler are called only the first time the script runs on any given day.

This script, saved as an application and placed in the Startup Items folder, causes the statements within the runToday handler to execute the first time the application runs each day.

```
property lastTimeIRan : ""

if lastTimeIRan is "" then
    copy (current date) to lastTimeIRan
    runToday()
else
    copy (current date) as text to newDate
    copy lastTimeIRan as text to oldDate
    if word 3 of newDate ≠ word 3 of oldDate then
        copy (current date) to lastTimeIRan
        runToday()
    end if
end if

on runToday()
    tell application "CEIAC"
        PlayByName "navrun"
    end tell
end runToday
```

Big deal. I use this script to run a CompuServe Navigator session first thing each morning. Since Navigator is not AppleScript-compatible, I recorded a macro in CE Software Inc.'s QuicKeys that starts Navigator, tells it to Do Everything (a Navigator command) and begins the session. This macro could also be performed by Affinity Microsystems Ltd.'s Tempo II.

On successive restarts of the Mac during the day, the script takes a couple of seconds to run, but it doesn't interrupt any more than the bomb that caused restarting the Mac in the first place.

What if we used UserLand Frontier? Part of the script would be easier to write because Frontier supports date arithmetic. And while Navigator does not work with AppleScript, it does work with Frontier. Frontier could speak directly to Navigator instead of having to go through the intermediary of QuicKeys. □

If you have scripting comments or questions, contact me on ZiffNet/Mac (72511,151), AppleLink (SMICHEL), or at MacWEEK's mailing address.

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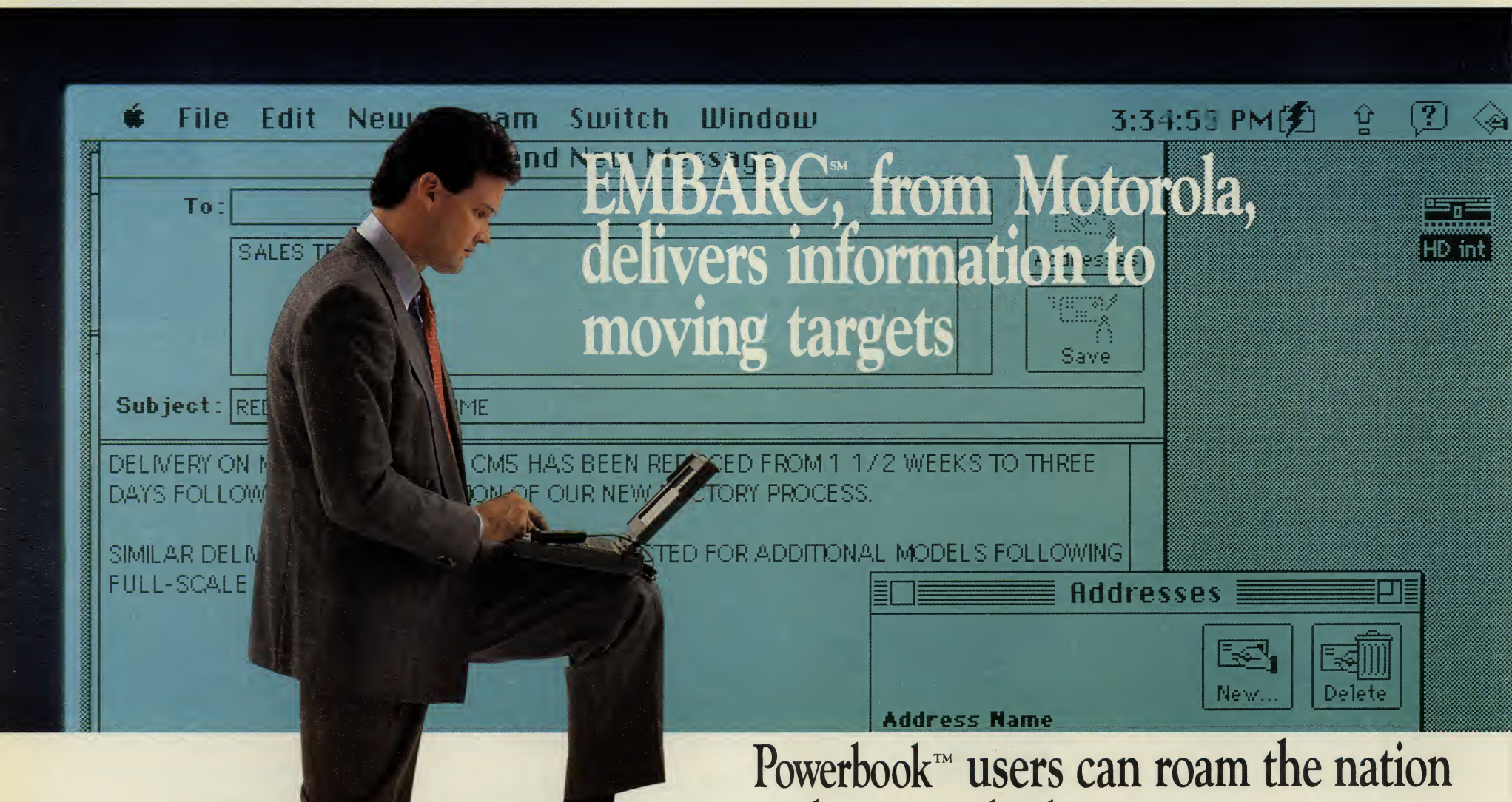

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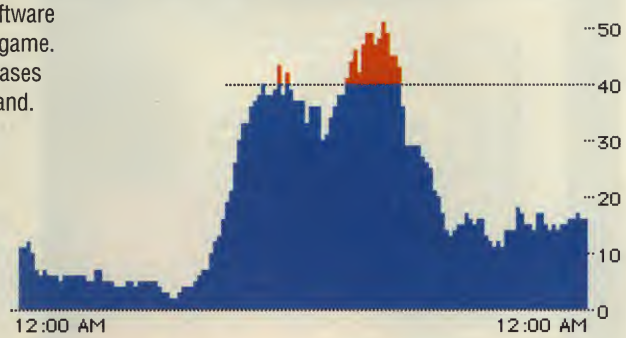

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Maximum enabled in histogram:	40
Peak requested in histogram:	51
Peak requested at:	3:14 PM 4/5/93
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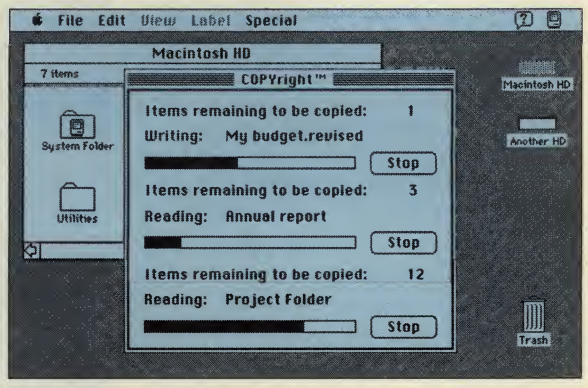

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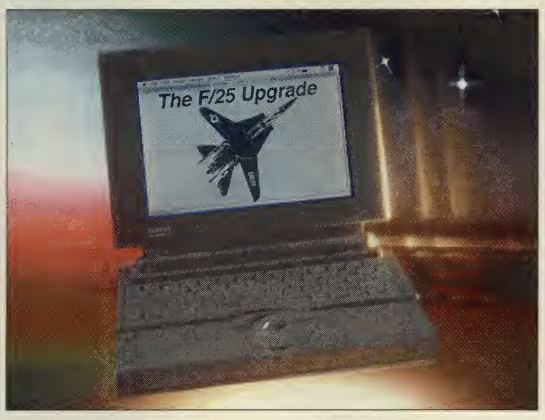

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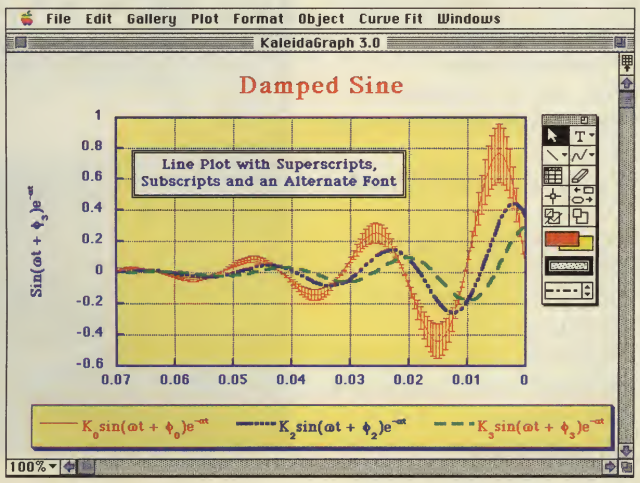

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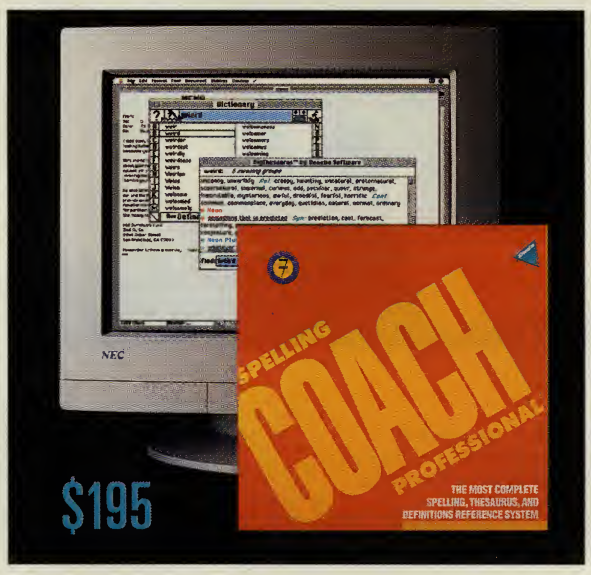

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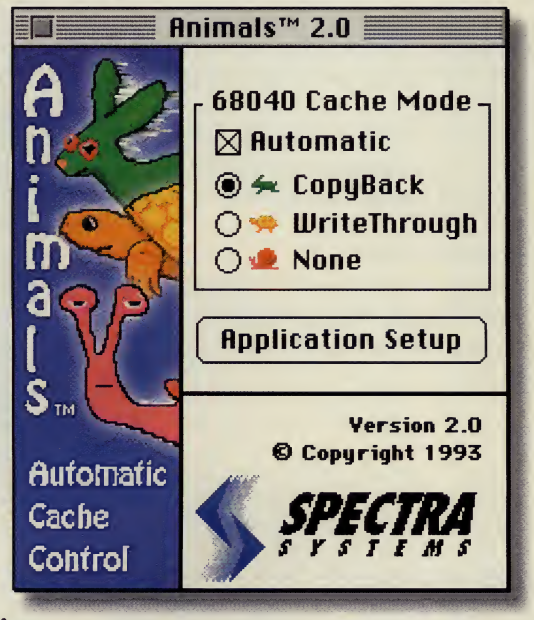

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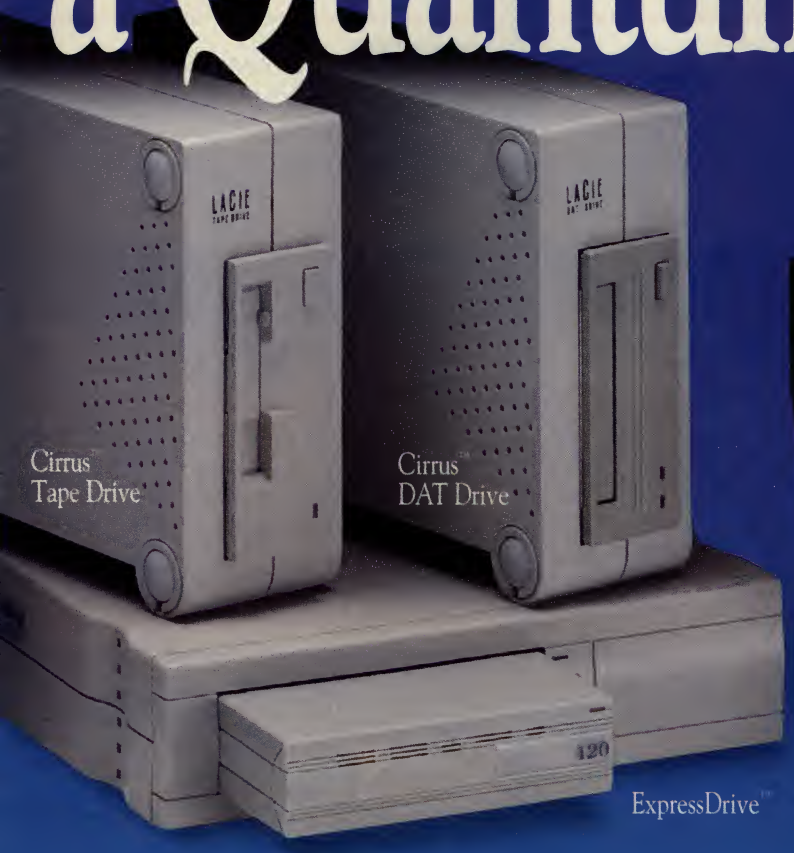

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Capacity (MB)	Model Number	Average Access Time (msec)	Transfer rate (K/sec)	MTBF (Hours)	MFG warranty (months)	Internal Drive Price	Zero Footprint Drive Price	Compact Drive Price
Connor								
85	CP-30080E	16	1300	150000	24	$199	$259	
120	CP-30100	16	1300	150000	24	$259	$309	
170	CP-30170E	16	1400	150000	24	$269	$329	
213	CP-30200	15	2000	150000	24	$349	$399	
Quantum								
85	ELS 85S	17	1800	250000	24	$199	$269	
127	ELS 127S	17	1800	250000	24	$229	$299	
170	ELS 170S	17	2000	250000	24	$259	$329	
240	LPS 240S	16	2300	250000	24	$329	$399	
80 (Pwrbk)	GO 120	17	1900	150000	12	$349		
Digital Equipment								
1.05GB	DSP-3105	9.5	2600	250000	60	$1,249	$1,299	$1,349
Seagate								
240 (PowerBook)	ST-9295N	16	2100	150000	12	$549		
1.05GB	ST-11200N	10.5	3200	200000	60	$999	$1,049	$1,099
Fujitsu								
520MB	M2624FA	9	2700	200000	60	$799	$859	$899
1.06GB	M2694FA	9	2800	200000	60	$1,399	$1,449	$1,499

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66-1200

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$285

SupraFax 14,400 V.32bis Modem

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Five-Year Warranty

11223 ..SupraFax Modem V.32bis 285
11246 ..SupraFax Modem V.32 96/96 V.42bis...279
11247 ..SupraFax Modem Plus 24/96 V.42bis ..142
11245 ..SupraFax V.32bis for PB 14.4/14.4 ..279

$106 2400/9600 Fax

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External 2400 bps data/9600 bps send/ receive fax.Hayes compatible;automatic answer;user modifyable non-volatile RAM;8 LED's & volume controlled speaker.

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3089.....2400 w/ Smartcom lifetime warr. ...99
5434.....2400/96 S/R fax w/QuickLink II 106
11045...PM14400FXMT 14.4 fax V.32bis..229

US Robotics®

Mac & Fax Sportster 14,400 + Fax

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11840...Sportster 2400 + Fax... 144
11842...Sportster 14,400 + Fax... 239

$239 Sportster 14,400 Fax Modem

$127 2400/9600 V.42bis Fax Modem #3576

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7757.....AFX 24/96 V.42bis Fax Modem.....74
3576.....Zoom 9624V FX Modem 127
3553.....V.32bis 14,400 VFX Modem 259

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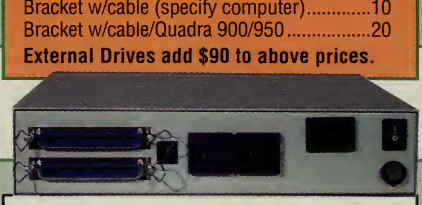
10412...127 MB ELS Drive 2yr warranty 259
10411...170 MB ELS Drive 2yr warranty 329
10142...105 MB Pro Drive 2yr warranty 299
10131...240 MB Pro Drive 2yr warranty 479
10130...525 MB Pro Drive 2yr warranty 859
10145...700 MB Pro Drive 5yr warranty 1215
10147...1050 MB Pro Drive 5yr warranty ..1289
10141...1225 MB Pro Drive 5yr warranty ..1649
Bracket w/cable (specify computer).....10
Bracket w/cable/Quadra 900/950.....20

External Drives add $90 to above prices.



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11541.....ErgoView 17.....1297

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10606 .MultiDisk Cartridge 65 MB.....79
10599 .MultiDisk Cartridge 105 MB 105
10602 .MultiDisk Cartridge 150 MB 149

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2899 ...PLI - 21 MB Floptical Cart ....(10) ...245
3016 ...PLI - 512 MB -5.25" Media ..(1) 129
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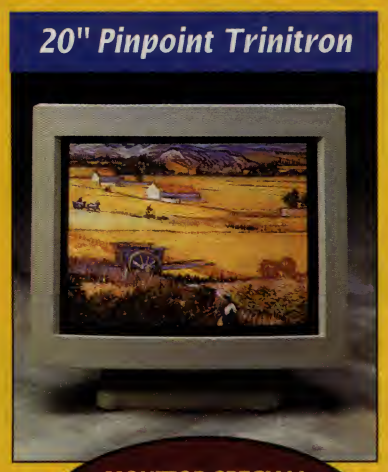

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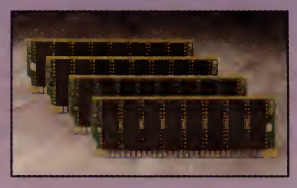

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ClubMac 88mb Internal $449
ClubMac 88mb Dual $849

SYQUEST CARTRIDGES
105mb / 88mb / 44mb .....$79 / 97 / 63

FEATURING
SyQuest® REMOVABLE TECHNOLOGY

SyQuest Drives carry a TWO Year Warranty.
SyQuest Cartridges carry a ONE Year Warranty.

Maxtor

***6300 RPM**

Unformatted Capacity	Model	Access Time	Actual MAC Capacity	Internal	External
XT SERIES & MXT SERIES (3.5" LOW PROFILE)					
120mb	7120S	15ms	121mb	$209	$269
540mb*	MXT-540	8.5ms	521mb	$899	$959
207mb	7213S	15ms	202mb	$299	$359
LXT & MXT SERIES (3.5" HALF HEIGHT)					
340mb	LXT-340	15ms	324mb	$569	$629
1240mb*	MXT-1240	8.5ms	1150mb	$1339	$1399
PANTHER SERIES (5.25" FULL HEIGHT)					
1.2GIG	PO-12S	13ms	997mb	$1049	$1149
1.7GIG	P1-17S	13ms	1433mb	$1299	$1399

Maxtor drives carry a TWO Year Warranty.

Seagate

FEATURING...THE ELITE DRIVES

Unformatted Capacity	Model	Description	Access Time	Actual MAC Capacity	Internal	External
3.5" DISK DRIVES						
248mb	ST3283N	Low Profile	12ms	235mb	$365	$425
1.2GIG	ST11200N	Half Height	10.5ms	1000mb	$1149	$1209
WREN AND ELITE SERIES (5.25" FULL HEIGHT)						
645mb	ST4767N	Wren Runner II	11.9ms	634mb	$1069	$1169
1.2GIG	ST41200N	Wren-7	15ms	989mb	$1149	$1249
1.6GIG	ST41651N	Wren-8	15ms	1350mb	$1349	$1449
2.1GIG	ST42100N	Wren-9	12.9ms	1900mb	$1725	$1825
1.6GIG	ST41600N	Elite-1	11.5ms	1307mb	$1825	$1925
2.4GIG	ST42400N	Elite-2	11ms	2050mb	$2439	$2539
3.4GIG	ST43400N	Elite-3	11ms	2750mb	$2949	$3049

Seagate drives carry a ONE Year Warranty.

ClubMac TAPE BACKUP Systems

TAPE BACKUP MEDIA

60 METER DAT	$13
90 METER DAT	$16
CT600N	$19
CT600F	$28
EXABYTE 8MM	$18

NOW SHIPPING WITH RETROSPECT V2.0 BACKUP SOFTWARE

Capacity	Model	Description	Media	Internal	External
155mb	Teac MT2ST/N50	Analog	CT600N	$429	$449
600mb	Teac MT2ST/F50	Analog	CT600F	$629	$649
2.0GIG	Archive Python	DAT, DDS	4mm	$1045	$1065
3-5GIG	Archive Turbo DAT	DAT, DDS-DC	4mm	$1329	$1349
2.0GIG	WangDAT 3100	DAT, DDS	4mm	$1045	$1065
3-5GIG	WangDAT 3200	DAT, DDS-DC	4mm	$1279	$1299
2.0GIG	Hewlett Packard 35470A	DAT, DDS	4mm	$1229	$1249
3-5GIG	Hewlett Packard 35480A	DAT, DDS-DC	4mm	$1379	$1399
2-5GIG	Exabyte 8205	Helical/Compression	8mm	$1675	$1695
5-10GIG	Exabyte 8505	Helical/Compression	8mm	$2629	$2649

Includes RetroSpect v.2.0 Backup Software, One Tape and ONE Year Warranty

ClubMac OPTICAL Drives

SHARP INTERNAL OPTICAL IS PERFECT FOR THE MAC IIVX, CENTRIS 650 & Q900/950

Model		Capacity	Description	Seek	Internal	External
CMO-M2511A	Fujitsu	128mb	3.5" Low Profile	35ms	$969	$999
CMO-OD3000	Teac	128mb	3.5" Half Height	45ms	$939	$969
CMO-3100E	Ricoh	128mb	3.5" Half Height	45ms	$1045	$1075
CMO-JY750	Sharp	594/652mb	5.25" Half Height	40ms	$2119	$2149
CMO-5031E	Ricoh	594/652mb	5.25" Full Height	28ms		$2345
CMO-Tahiti II	MaxOptix	650mb/1.0GIG	5.25" Full Height	35ms		$2999
128mb Cartridge		3.5" Single Sided				$39
594/652mb Cartridge		5.25"-512/1024 bytes/sec				$99
ZCAV Cartridge		5.25" for MaxOptix				$175

All ClubMac Opticals include ONE cartridge and ONE Year Warranty.

ACCELERATORS

DAYSTAR DIGITAL

MONEY BACK 30 DAY GUARANTEE

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NEW 25 MHZ TURBO 040 ..... $1079
33 MHZ TURBO 040 ..... $1329
NEW 40 MHZ TURBO 040 ..... $2059
FASTCACHE FOR TURBO 040 ..... $175
CHARGER FOR PHOTOSHOP $789

COMPATIBLE WITH CLASSIC, SE, LC, SE/30, II, IIX, IICX, IISI, IICI, PERFORMA

*POWERCACHE ADAPTER NOT INCLUDED	W/O FPU	W/ FPU
33 MHZ POWERCACHE*	$375	$459
40 MHZ POWERCACHE*	$545	$635
50 MHZ POWERCACHE*	$715	$845
EQUALIZER LC	$169	$239
POWERCACHE ADAPTER	$41	

CACHE CARDS

FASTCACHE IISI / IISI WITH FPU $279/349
FASTCACHE IICI $199
FASTCACHE QUADRA - Q700/900 ..... $249
FASTCACHE QUADRA - Q700/900/950 ..... $375

EXPANSION BOARDS

DUALPORT IISI/ POWERMATH LC ..... $165 /115

RADIUS

ROCKET 33 $1699

- NuBus-based processor, powered by the 33MHz Motorola 68040
- Increases processing speed of the original Mac up to 8 times even exceeding Quadra performance in most cases

NEW! LOW PRICE

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SCSI-2 BOOSTER $249
ROCKETSHARE $399

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THUNDERSTORM DELUXE $869
THUNDERSTORM $599

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SILVER (96/96 S/R FAX MODEM) $329
GOLD (14,400 S/R FAX MODEM) $379

TELEPORT (EXTERNAL DESKTOP FAX/MODEMS)

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SILVER (96/96 S/R FAX MODEM) $329
GOLD (14,400 S/R FAX MODEM) $385

PSI

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POWERMODEM III / IV ..... $315 / 375
COMSTATION I / COMSTATION V ..... $135 / 429
COMSTATION NETWORK SOFTWARE $165

SUPRA TECHNOLOGY

SUPRAFAXMODEM V.32 WITH SOFTWARE $279
SUPRAFAXMODEM V.32 STANDALONE $235
SUPRAFAXMODEM 14.4 V.32 BIS WITH SW $299
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MEMORY PRICES CHANGE FREQUENTLY, CALL FOR CURRENT PRICES

STANDARD MAC

1MB / 2MB X 8 ..... $33 / 65
4MB X 8 / 4MB WITH PAL ..... $139 / 145
8MB / 16MB X 8 ..... $295 / 555

MAC IIFX

1MB / 4MB / 16MB FX ..... $36 / 135 / 555

CENTRIS 610/650/LCIII

4MB / 8MB / 16MB ..... $135 / 265 / 545

DUO 210/230

4MB / 8 MB ..... $225 / 319

POWERBOOK 140/145/170

4MB / 6MB ..... $160 / 219

POWERBOOK 160/180

4MB / 6MB ..... $175 / 249
8MB / 10MB ..... $335 / 415

QUADRA 700

8MB / 16MB LOW PROFILE ..... $329 / 575

QUADRA 800

4MB / 8MB / 16MB ..... $170 / 305 / 715

QUADRA 950

16MB $585

VIDEO RAM

256K VRAM FOR QUADRAS $23
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GET A $100 REBATE WHEN YOU BUY THE NEC MACFG 24XP COLOR DISPLAY INTERFACE CARD AND A 15" OR 17" MULTISYNC FG COLOR MONITOR.

COLOR MONITORS

15" MULTISYNC 3FGx $609
15" MULTISYNC 4FG (ACCUCOLOR) $729
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17" MULTISYNC 5FG (ACCUCOLOR) $1299
21" MULTISYNC 6FG (ACCUCOLOR) $2349

COLOR DISPLAY INTERFACE CARDS

MACFG 8X / 24Xp / 24X $639/495/1199

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MONITORS

COLOR DISPLAY/21 ..... $2319
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PRECISIONCOLOR/19 ..... $2029
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2-PG DISPLAY19 / 21 / 21E $875/1139/1299

VIDEO CARDS

PRECISIONCOLOR 8XJ / 24X ..... $489 / 1499
PRECISIONCOLOR 24XP / 24XK ..... $489 / 815
UNIVERSALCOLOR 24 SM / LG ..... $499 / 839
COLOR PIVOT / MONO PIVOT ..... $499 / 249
2-PG / FULL PG DISPLAY ..... $375 / 189

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21" COLOR (2168) $2519
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VIDEO CARDS

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MONITORS

SUPERMATCH 20" / 21" COLOR $1519/ 2435
SUPERMATCH 20T MULTIMODE XL $2599
SUPERMATCH 17T $1069

VIDEO CARDS

THUNDER 8 / 24 ..... $1129 / 2259
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SPECTRUM 24 SERIES IV $825

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MONITORS

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VIDEOSPIGOT IISI* / LC $299/245
VIDEOSPIGOT PRO NUBUS** $1039
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EN/SC $315
MINI EN/SC $325

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THK/THN, 64K, FPU SOCKET $159
THK/THN, 64K, FPU CHIP $255

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THN/10BT, FPU SOCKET $205
10BT, FPU SOCKET $155
10BT, FPU CHIP $255

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NEC

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SILENTWRITER 95FX (BUILT-IN PS FAX) ..... $1249 *
SILENTWRITER 97FX (BUILT-IN PS FAX) ..... $1479 *

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WARRANTIES: All items manufactured by ClubMac are returned to ClubMac for warranty repair. All other items carry manufacturer's warranty. MONEY BACK GUARANTEE: All products manufactured by ClubMac carry a 30 day money back guarantee. ClubMac extends all other manufacturers' return policies to its customers.Non-ClubMac products carry 30 day money back guarantee when specified. RETURNS: Call for RMA number! Any product that is returned WITHOUT an RMA number will be refused. ALL PRODUCT INFORMATION AND PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE. NOT RESPONSIBLE FOR TYPOGRAPHICAL ERRORS.

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33 MHz Universal PowerCache	**$375**
33 MHz Universal PowerCache with 68882	**$465**
33 MHz Turbo 040	**$1349**
50 MHz PowerCache with 68882	**$849**
PowerCache Adapters	**$40**
FastCache Quadra 700, 900, 950 0r 800 (128K)	**$399**

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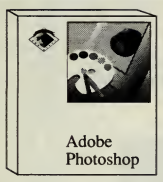
Suntouch Mac Extended Keyboard $89
105-key enhanced keyboard layout featuring 15 function keys, separate numeric pad & cursor keypad, extra-large RETURN key, ergonomically angled, 1 year warranty.

Software



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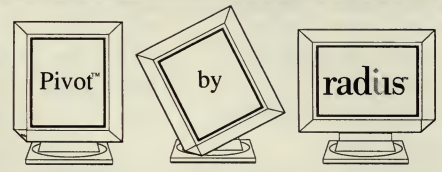
Powered by the 33 MHz Motorola 68040, the Rocket 33 increases Mac II performance up to eight times. Includes math coprocessor and RocketWare software.

Radius™ PrecisionColor™ Pivot® Display **$899**



15-inch, dual-orientation, anti-glare, color full page display compatible with all Color Pivot interfaces & most Precision Color interfaces.

Radius PrecisionColor Display/20S **$2199**
Multi-frequency, 20-inch Trinitron® color display for Macintosh and PC. "On-the-fly" resolution switching. Comes with PrecisionColor software bundle.

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Radius Two Page Display/19 monochrome **$849**
19-inch, landscape, Two Page display display for Mac and PC computers. Mac resolution is 1152x 882 at 71Hz at 82 dpi.

Color Pivot Interfaces (NuBus, IIsi, LC, SE/30)	**$499**
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17" screen; .28mm dot pitch; 135MHz bandwidth, 1024 x 768 non-interlaced.

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Large 21", .28mm dot pitch, 135MHz, 1024x768 non-interlaced

$100 Rebate Get a $100 rebate from NEC when you purchase a MacFG 24Xp card with either a 15" or 17" MultiSync FG monitor. Offer ends June 30, 1993.

NEC MacFG24xp card. $549
24-bit color NuBus card with QuickDraw acceleration

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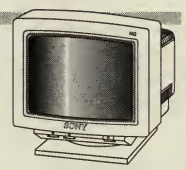

Sony CPD-1304S. $569
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Sony CPD-1604S $1049
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SuperMatch™ 17" Multimode Color $949
Low-cost large screen color display for business productivity. For Mac or PC.

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Flexible viewing, realistic colors for design and publishing

SuperMatch 20•TXL MultiMode Trinitron. ... $2599
Large-screen 20" Trinitron color with unmatched versatility.

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NEC

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- Receive and print conventional or high-quality PostScript faxes on plain paper
- 2MB RAM / 6ppm / 35 resident fonts
- Automatically switches interfacebetween Mac & DOS platforms

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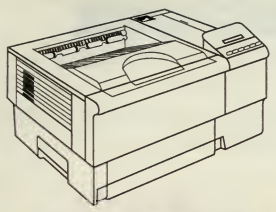
Toner Cartridge for 95/97 ..... $165



***Price after $250 mail-in rebate from NEC. Offer ends 6/30/93**

$2999 with Two Trays

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LZR 1560™ Ledger/A3 Laser Printer
15 PPM; 300 or true 400 dpi resolution, 4MB RAM; Adobe PostScript Level 2; supports 11"x17" (ledger) size paper; models with one, two or three 250 count input trays

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Shiva's multi-protocol, single-line remote networking server for AppleTalk and NetWare networks, includes a built-in V.32bis and V.42bis High-speed modem and Ethernet connector.

NetModem V.32 ..... **$969**

FastPath 5R Router/Gateway **$1599**

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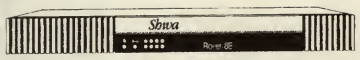
LanRover™/E



LanRover/E is Shiva's high-performance, rack-mountable, multi-port remote networking server for Ethernet networks. LanRover/E allows you to dial into a network and access file servers, printers, e-mail, or network applications. LanRover/E can be managed from any computer, and attaches directly to thick, thin, or 10BaseT Ethernet.

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MacWeek 5/17/93

Mon-Thurs:
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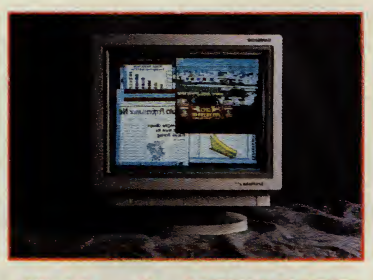

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$999 External

Internal for Quadra 900 & 950

$969

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- Every Drive Tested and Retested
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THE APS ADVANTAGE

The APS 128MO

Proven MO technology avoids data integrity problems common to other removable drive systems. Now, transport, store and access multi-megabyte documents on low-cost, high-density MO cartridges with Epson's Magneto-Optical Drive system. Epson's MO stores 128MB on durable $49 diskettes.

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The APS SyQuest 44 and 88 are the transportable storage standard in the Macintosh market. True interchangeability has been the only problem in an otherwise idyllic transportable storage world. The APS SyQuest 5110c solves the problem. With both 44MB and 88MB cartridge read and write compatibility, exceptional construction, superior components and legendary APS service and technical support, you can't go wrong.

Order a drive, Get a Bundle

Every APS128MO andAPS SyQuestDrive comes bundled with Dantz's DiskFit Direct.

APS REMOVABLE CARTRIDGE DRIVES

MAGNETO OPTICAL

Model	Internal*	External
APS 128MB MO	$969	$999

Mechanism is Epson Magneto-Optical OMD-5010

128MB Magneto Optical Drive
** Internal models for Quadra 900 and 950*

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New! The SyQuest 5110c reads & writes 44 & 88MB cartridges!

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Model	Internal	External
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APS 80GRS[1]	$299	$429†
APS 120[1]	339	469†
APS 160GRS[1]	499	629†
TOSHIBA		
APS T 213[1] Toshiba 2224 mechanism	599	729†

†Battery-Powered Companion Case for the PowerBook

APS HARD DRIVES

Model	Internal	External
MW EDITORS' CHOICE **QUANTUM**		
APS Q 85 ELS[2] Quantum 85ELS mechanism	$199	$269
APS Q 127[2] Quantum 127ELS mechanism	229	299
APS Q 170[2] Quantum 170 ELS mechanism	259	329
APS Q 240[2] Quantum LP240 mechanism	339	409
APS Q 525[2] Quantum Lps525 mechanism	899	969
APS Q 1225[5] Quantum 1225P mechanism	1359	1429

Dantz's Disk Fit Direct included with all drives

Model	Internal	External
MICROPOLIS		
APS MS 560[5] Micropolis 2105 mechanism	$899	$969
APS MS 1.1G[5] Micropolis 2112 mechanism	1299	1369
APS MS 2.4G[5] Micropolis 1924 mechanism	2699	2799
MW EDITORS' CHOICE **FUJITSU**		
APS F 520[5] Fujitsu M2624S mechanism	799	869
APS F 1.2G 5.25"[5] Fujitsu M2694 mechanism	1249	1349
APS F 1.2G 3.5"[5] Fujitsu M2694 mechanism	1599	1669
APS F 2.0G[5] Fujitsu Super Hummingbird mechanism	2249	2349

Model	Internal	External
Mac User LABS ★★★★ **MAXTOR**		
APS MX 120[2] Maxtor 7120 mechanism	$199	$269
APS MX 213[2] Maxtor 7213 mechanism	279	349
APS MX 340[2] Maxtor LXT340 mechanism	499	569
APS MX 540[2] Maxtor MXT540 mechanism	899	969
APS MX 1240[3] Maxtor MXT1240S mechanism	1499	1569
TOSHIBA		
APS T 1.2G[3] Toshiba MK- 538 mechanism	1099	1169

1-5 Denotes length of manufacturer's warranty

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Mac User LABS

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Retrospect included with all Mac tape drives

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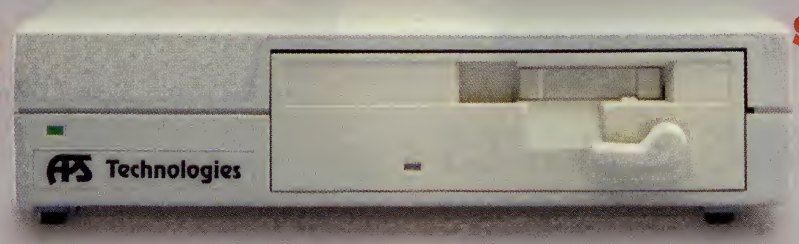

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APS TEAC 155
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POWERBOOK ACCESSORIES

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2400 baud	$69
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9600 baud v.32	$279
14,400 baud v.32 bis	$349

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APS SCSI BOY

APS SCSI Boy $29

- *The Ultimate PowerBook Necessity*
- *Rugged Palm-Sized 25–30 PowerBook SCSI Adapter*
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Model	External	Special
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**Includes Four-Disc APS CD bundle , including Electronic Encyclopedia, Sherlock Holmes interactive detective game and more.*

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All APS Tape Drives Include Retrospect by Dantz

DAT

Mac User LABS

Model	Internal*	External
APS TurboDAT	$1399	$1499
APS DAT	1099	1199

**Internal models for Quadra 900 & 950*

All APS DAT Drives Include Retrospect by Dantz

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- All our hard drives include brackets, cables, cords and LEDs required for operation with the specified Macintosh. All hard drives from APS Technologies come preformatted with Apple's System 7.0.1 software, at least 9.2 MB of compacted publicly-distributable software, and APS Technologies' ALLIANCE POWER TOOLS SCSI formatter/hard disk partitioner.
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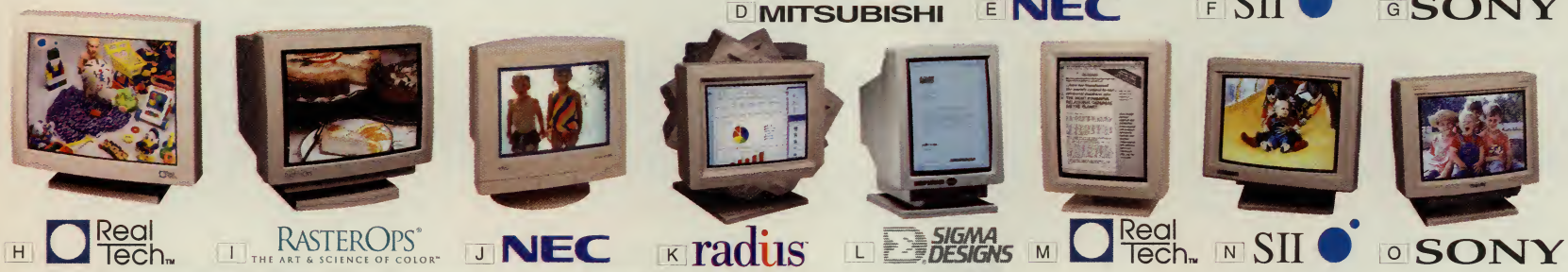

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* E-Machines 16" Color (ColorPage T16)

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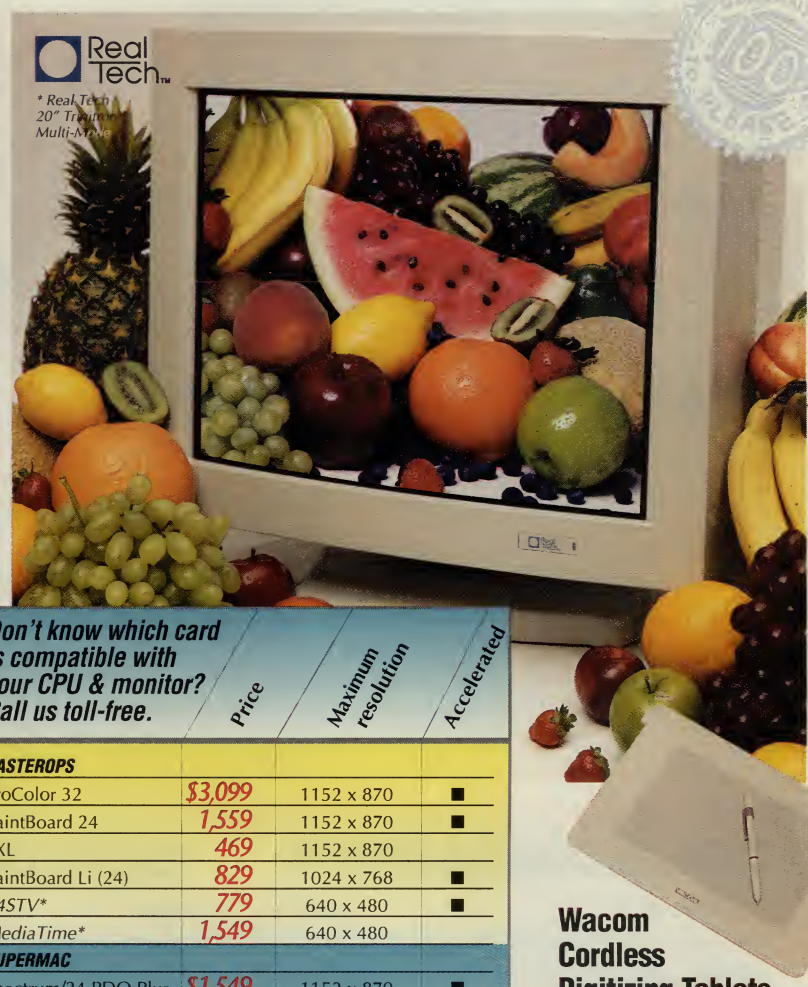
SUPERMAC



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Need help choosing a monitor? Not sure if you need one that auto-syncs? Call our friendly sales team. They're happy to answer your questions.	Price	Tube type	640 x 480	640 x 870	832 x 624	1024 x 768	1152 x 870	Auto-syncing	Anti-glare
A. Radius 21" Color	$3,069	Hitachi					■		■
NEC 21" 6FG Color	2,699	NEC	■		■	■	■	■	
SuperMac 21" Mono/Grayscale	989	—					■		■
B. SuperMac 20" (SuperMatch)	$1,499	Hitachi				■			■
C. NEW! RasterOps 20" Trinitron Multi-Mode	2,359	Trinitron	■		■	■	■	■	■
* RealTech 20" Trinitron Multi-Mode	1,895	Trinitron	■		■	■	■	■	■
NEW! Radius IntelliColor 20"	2,759	Trinitron	■		■	■	■	■	■
RasterOps 20" Hitachi Color	1,329	Hitachi	■		■	■		■	■
* NEW! SuperMatch 20•T Multi-Mode XL	2,699	Trinitron				■	■		■
E-Machines 19" Color (T19 II)	2,399	Trinitron				■	■	■	■
D. Mitsubishi 17" Diamond Pro	$1,199	Trinitron	■		■	■	■	■	■
E. NEC 17" 5FG Color	1,539	NEC	■		■	■	■	■	
F. Seiko Instruments 17" CM1760LR	1,249	Trinitron	■		■	■		■	■
G. Sony 17"	1,149	Trinitron	■		■	■		■	■
H. RealTech 17" Multi-Mode	995	Hitachi	■		■	■		■	■
I. RasterOps 16" (RasterOps Sweet 16)	$1,199	Panasonic			■				■
* E-Machines 16" Color (ColorPage T16)	1,299	Trinitron	■		■	■		■	■
J. NEC 15" 4FG Color	899	NEC	■		■	■		■	
K. Radius 15" Precision Color Pivot	$959	Non-Trinitron	■	■	■	■		■	■
L. Sigma 15" Grayscale (PageView GS)	579	Phillips		■					■
M. RealTech 15" Grayscale	449	—		■					■
Sigma 15" Grayscale (Power Portrait)	659	Phillips		■					■
NEC 15" 3FGX Color	669	NEC	■		■	■		■	
N. Seiko Instruments 14" Color (CM1445)	$499	Trinitron	■						■
O. Sony 13" Color	689	Trinitron	■						■

* shown above

Your Hardware That Fits partner will tell you which monitors are on-board compatible, and which ones require a card or cable.

Don't know which card is compatible with your CPU & monitor? Call us toll-free.	Price	Maximum resolution	Accelerated
RASTEROPS			
ProColor 32	$3,099	1152 x 870	■
PaintBoard 24	1,559	1152 x 870	■
8XL	469	1152 x 870	
PaintBoard Li (24)	829	1024 x 768	■
*24STV**	779	640 x 480	■
*MediaTime**	1,549	640 x 480	
SUPERMAC			
Spectrum/24 PDQ Plus	$1,549	1152 x 870	■
Spectrum/8 NuBus	419	1024 x 768	
Spectrum/8 LC II, IIsi	499	1152 x 870	
Spectrum/24 Series IV	829	1024 x 768	■
Spectrum/8•24 PDQ	829	640 x 480	
Spectrum/8•24	579	640 x 480	
Thunder 24	2159	1152 x 870	■
ThunderLight	1669	1152 x 870	■
*Video Spigot**	369	160 x 120	
*Video Spigot & Sound**	479	160 x 120	
RADIUS			
Precision Color 24X	$1,649	1152 x 882	■
Precision Color 8XJ	499	1152 x 882	■
Precision Color 24XK	829	1024 x 768	■
Precision Color 24XP	499	832 x 624	■
*Video Vision**	1,979	640 x 480	
E-MACHINES			
ColorLink DC/T (8-bit with Ethernet)	519	1024 x 768	■
ColorLink SX/2 (24-bit with Ethernet)	649	1024 x 768	■
Futura SX24	499	1024 x 768	■
DoubleColor LX (8)	699	1152 x 870	■

**24-bit; captures up to 30 frames per second*

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$489

Lease: $60/mo.

Cordless, pressure sensitive stylus translates your pen-strokes into line width, spray density, color changes, and other programmable effects. Paint, draw, trace, and point as naturally as if you were writing. The standard tablet has a plain surface. The electrostatic tablet is ideal for video graphics, photo retouching, and print pre-press work.

Wacom ArtZ Graphics Tablet

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12" x 12" Standard 689
12" x 12" Electrostatic 759
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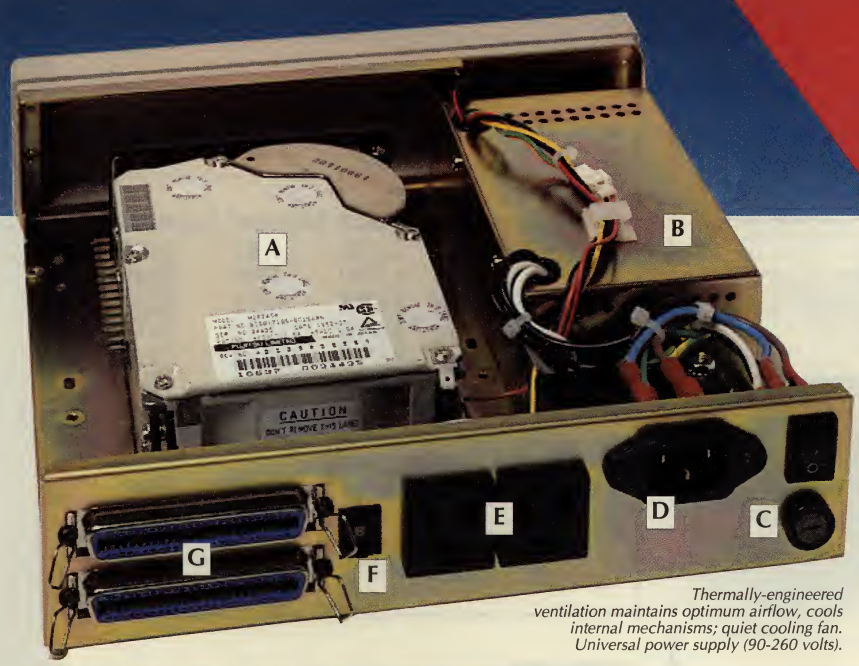
Hard drives



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- *top-level warranties on all mechanisms*
- *2-year warranty on enclosure*
- *and...*

A. *We use the highest quality name-brand mechanisms available; fully tested and burned in*

B. *Shielded 40 watt power supply (65 watt for FH drives) provides an additional margin of safety from electrical interference, keeping your data free of corruption*

C. *External fuse keeps fuse replacement simple*

D. *Power cable plug-in*

E. *Two switched outlets provide power to additional peripherals, allowing 1-step system power-up*

F. *Easy-to-use pushbutton SCSI I.D. selector switch*

G. *Two 50-pin SCSI connectors for simple configuration*

(Not shown) Premium double-shielded 26-inch Mac-to-SCSI cable prevents electronic interference

Do you need a fixed hard drive, or the flexibility of a floptical? Call us; we can explain your options.	Model number	Internal price	External price	Formatted Mac capacity (in MB)	Average access time (in ms)	Transfer rate* (in Mb/second)	Form factor**	Warranty (years)
80 - 120 MB								
Conner 85	CP-30080E	$209	$279	82	17	1.5	LP	1
Quantum 85	ELS85	205	275	82	17	1.4	LP	2
Conner 120	CP-30100	259	329	116	17	1.5	LP	1
Maxtor 120	7120XT	229	299	121	15	1.5	LP	2
120 - 250 MB								
Quantum 127	ELS127	$259	$329	124	17	1.4	LP	2
Conner 170	CP-30170E	289	359	160	9	1.5	LP	1
Quantum 170	ELS170	279	349	160	17	1.4	LP	2
Conner 212	CP-30200	369	439	206	12	2.5[1]	LP	1
Maxtor 213	7213	329	399	207	15	2.8	LP	2
Quantum 240	LPS240	369	439	234	10	1.4	LP	2
Maxtor 245	7245	359	429	245.6	15	3.0	LP	2
320 - 570 MB								
Maxtor 340	LXT-340	$599	$669	324	15	2.1[1]	HH	2
Fujitsu 520	M2624FA	899	969	496	9	2.7[1]	HH	5
Quantum 525	LPS525	929	999	500	10	3.2[1]	LP	2
Maxtor 540	MXT-540	969	1039	546	9	5.5[1]	HH	2
Conner 540	CP-3540	899	969	515	12	5.5[2]	HH	1
Micropolis 560	M2105	1069	1139	560	10	5.0[2]	HH	5
700 MB - 1.3 GB								
Quantum 700	PRO700	$1249	$1319	700	10	2.9[1]	HH	2
Micropolis 800	M2108	1349	1419	698	10	5.0[1]	HH	5
Toshiba 877	MK-438FB	1099	1169	830	12.5	3.0[1]	HH	2
Quantum 1050	PRO1050	1419	1489	1000	10	2.9[1]	HH	2
HP 1050	97558	1649	1749	987	13.5	2.8[1]	FH	5
Fujitsu 1.2	M2266	1249	1349	1079	14.5	3.0[1]	FH	5
HP 1.2	C2247	1589	1659	1000	10.5	5.3[1]	HH	5
Micropolis 1.2	M2112	1449	1519	1005	10	5.0[1]	HH	5
Quantum 1.2	PRO1225	1599	1669	1200	10	2.9[1]	HH	2
Toshiba 1.2	MK-538FB	1399	1469	1200	12.5	4.0[1]	HH	3
Maxtor 1.2	MXT-1240	1549	1619	1240	9	4.5[1]	HH	3
Conner 1.3	CP-31370	2059	2129	1030	10.5	6.0[1]	HH	1
1.5 - 3.6 GB								
Micropolis 1.5	M1528	$2299	$2399	1341	14.5	2.9[1]	FH	5
Micropolis 1.6	M1548	2379	2479	1748	14	4.8[1]	FH	5
Fujitsu 2.0	M2652	2299	2399	1752	11	4.8[2]	FH	5
Seagate 2.1	ST42100N	1999	2099	1900	12.9	3.9[2]	FH	5
Fujitsu 2.4	M2654	2549	2649	2000	11	4.8[2]	FH	5
Micropolis 2.4	M1924	2649	2749	2100	11.5	4.5[2]	FH	5
Seagate 2.4	ST42400N	2879	2979	2050	11s	4.5[2]	FH	5
HP 2.4	C3010	2899	2999	2000	11.5	5.3[2]	FH	5
Seagate 3.4	ST43400N	3999	4099	2750	11	6.0[2]	FH	5
Micropolis 3.6	M1936	4199	4299	3022	12	6.0[2]	FH	5

* Transfer rate (or throughput) depends on your Mac CPU and system configuration. For more information, ask your Hardware That Fits sales partner. ***Form Factor Low Profile (LP)=3.5 Half Height (HH)=3.5 Full Height (FH)=5.25*

[1] SCSI-2 [2] SCSI-2 Fast ***These drives are most efficient when used with a Macintosh Quadra 800, 950 or a RealTech SCSI-2 card.***

REMOVABLES*

REALTECH® FLOPTICAL®

21 MB Drive w/1 disk *$339*
Drive w/Diskette 5-pack..... *399*

REALTECH MAGNETO-OPTICAL

128 MB Epson Drive w/1 disk (29 ms access time; 1 yr. warranty)..... *$1069*
Drive w/Diskette 5-pack..... *1229*

Maxoptix Tahiti IIm Drive (652/1.0 GB capacity; 35 ms access time; 1 yr. warranty) .. *$3269*

REALTECH TAPE BACKUP

Includes Retrospect 2.0 backup software.
TEAC 155 MB Drive..... *$499*
TEAC 600 MB Drive..... *749*

REALTECH DAT

DDS-DC Drive (2-8 GB capacity; 1 yr. warranty; includes Retrospect 2.0 backup software)..... *$1399*

The RealTech DAT Drive uses industry-standard DDS-DC compression on a 90-meter tape. Depending on your data, storage capacities may vary from 2 to 8 GB.

SYQUEST®

44 MB Drive..... *$389*
88c MB Drive *599*

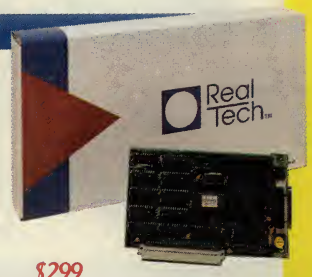
REMOVABLE MEDIA

21 MB Floptical Diskette..... *$21*
5-pack of Floptical Diskettes *105*
128 MB Optical Diskette..... *$49*
5-pack of Optical Diskettes..... *209*
652 MB M-O Cartridge *99*
1.0 GB ZCAV M-O Cartridge *239*
155 MB TEAC Tape..... *$19*
600 MB TEAC Tape..... *28*
60-meter DAT Tape..... *$13*
90-meter DAT Tape..... *16*
44 MB SyQuest Cartridge..... *$63*
88 MB SyQuest Cartridge..... *97*

REALTECH DRIVE UTILITIES SOFTWARE

Included with your drive, for efficient operation. Disk partitioning; password protection; diagnostic testing; multiple SCSI-bus support; extensive on-line help; and more. Also included with your drive, System 7.0.1.

REALTECH SCSI-2 CARD



Allows all NuBus Macs to communicate with newer, high-performance hard drives at substantially faster transfer rates. Sustained transfer rate of up to 4.4 MB per second, plus a burst transfer rate of 6 MB per second (6/10 on a Quadra). Mirroring capabilities. *$299*

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YOU'VE BEEN BUYING FROM US SINCE 1985.

To a lot of you, we've become a trusted business partner. So when you told us we needed to offer you more storage options, we listened.

Our systems engineers have worked tirelessly to design the best possible enclosure for name-brand mechanisms.

The result? These drives are the value you've been looking for—priced right, and built with the quality your irreplaceable data demands.

During the past eight years, we've become America's one-stop source for Macintosh solutions. Now we can be your one-stop source for storage solutions, too. Because we're the company you can trust to give you the very best...

- **QUALITY**
- **SERVICE**
- **VALUE**

Stack up our drives against the "best of the best" and they'll come out on top. You can trust us to always bring you the highest-quality Mac hardware!

Limited time offer!

Included FREE with your drive...award-winning Now Utilities (Version 4.0.1).

Includes 7 powerful utilities: Startup Manager, Super Boomerang, WYSIWYG Menus, Now Profile, Now Scrapbook, Now Save, Now Menus. Use Now Utilities to maximize System 7's capabilities, and to simplify using your Mac.

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30-DAY MONEY-BACK GUARANTEE on all hardware (except leases, printer consumables and special-order items). Sorry, no returns on PowerBooks. Before returning merchandise, call our Customer Service Dept. toll-free to receive a returned merchandise authorization number (RMA), which must be included with any returns. No C.O.D. returns. Thank you for your cooperation. ALL PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE. Hardware That Fits is located at 610 S. Frazier in Conroe, TX 77301.

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TEAC

Model	Speed	Size	External
128mb	45ms	3.5"HH	$979
128mb cartridges (Tosoh)			$39

FUJITSU *NEW!*

Model	Speed	Size	External
128mb	30ms	3.5"TH	$1049
128mb cartridges (Tosoh)			$39

Maxtor

Model	Speed	Size	External
Tahiti IIM	35ms	1.0gb	$3095
1.0gb Optical Glass Cartridge			$225

All MO drives came with FWB HDT software, ane MO cartridge and have a ONE year Warranty.

SHARP

Model	Speed	Size	External
650mb	40ms	3.5"HH	$2295
650mb Cartridge			$99

THE ONLY 5.25" HH 650MB OPTICAL ON THE MARKET!

TAPE BACK-UP

ARCHIVE

SPECIAL! 2.0gb DAT – $999 –

Model	External
2.0gb Standard	$999
4.0gb - 8.0gb Compression Turbo	$1399
90m /60m Tape	$19/$16

TEAC

Model	External
150mb Tape Backup Drive	$489
600mb Tape Backup Drive	$689
600mb / 150mb Tape Cassette	$25/$20

All tape backup drives come bundled with FREE Retraspect V.2.0, ane tape and have a ONE year warranty.

CD-ROM DRIVES

TOSHIBA

Model	Speed	Size	External
600mb	200ms	3.5"HH	$549

TEXEL *NEW!*

Model	Speed	Size	External
600mb	265ms	3.5"HH	$499

CD-ROMs are Dual-Speed & Kadak Phata-CD/Multi-sessiancampatible. Bundled with FWB™ CD-ROM Tool Kit. Tashiba and Texel carries a ONE year Warranty.

EXTERNAL DRIVE HOUSINGS

Complete with SCSI Cable, Power Cord and FWB™ HDT Formatting Software.

Full Height	$145
Half Height	$85

SyQuest

MAY SPECIAL! *NEW Syquest 105mb external kit with one additional cartridge* **$799**

Model	
External SyQuest 44mb (One Cartridge Inc.)	$385
External SyQuest 88mb (One Cartridge Inc.)	$485
External SyQuest 88mb C* (One Cartridge Inc.)	$575
External SyQuest 105mb (One Cartridge Inc.)	$745
Internal 44mb SyQuest (for Quadra 900 &950)	$355
Internal 88mb SyQuest (for Quadra 900 &950)	$455
Internal 88mb C SyQuest (for Quadra 900&950)	$545
External SyQuest Dual 44mb (One Cartridge Inc.)	$695
External SyQuest Dual 88mb (One Cartridge Inc.)	$875
External SyQuest Dual 44/88mb (One 44 & One 88 Cartridge)	$875
External SyQuest Dual 88C mb (One Cartridge Inc.)	$1045
External SyQuest Dual 44/88C mb (One 44 & One 88 Cartridge)	$965
SyQuest 44mb Cartridge/10 Pack	$62.50/$610
SyQuest 88mb Cartridge/5 Pack	$96.50/$475
SyQuest 105mb Cartridge/5 Pack	$79/$390

FREE! *All Syquest 44/88 cartridges are bundled with DIVA VideoShop – a $599 value – free!**

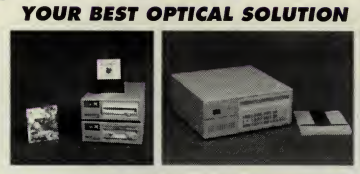
*All SyQuest Drives come with FWB™ HDT Formatting Software. SyQuest carries a TWO year Warranty on Drives and ONE year on Cartridges. *READS AND WRITES 44 AND 88 CARTRIDGES. Does not format 44 cartridges.*

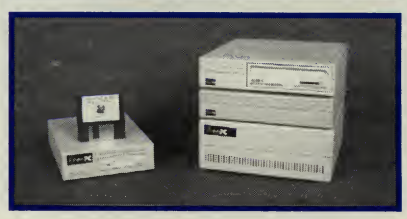
RICOH RELIABILITY, PERFORMANCE AND *SPEED!*

Model	Capacity	Size	Seek	External
CMO-3100E	128mb	3.5"HH	45ms	$995
CMO-5031E	650mb	5.25"HH	28ms/3600rpm	$2295
128mb/650mb Cartridge (Tosoh/3M)				$39/99

- ISO Certified/Industry Standard
- External Kits include all necessary cables, one optical media, and FWB™ HDT Formatting Software.
- One year warranty

RICOH
YOUR BEST OPTICAL SOLUTION





Quantum

"An Apple Authorized Brand"

Formatted Capacity	Speed	Size	Internal	External
ELS 42mb	19ms	3.5"TH	$169	$229
ELS 85mb	17ms	3.5"TH	$195	$255
ELS 127mb	17ms	3.5"TH	$225	$285
ELS 170mb	17ms	3.5"TH	$255	$315
LPS 240mb	10ms	3.5"TH	$335	$395
LPS 525mb	10ms	3.5"TH	$865	$925
Pro 700mb	10ms	3.5"HH	$1035	$1095
Pro 1.05gb	10ms	3.5"HH	$1195	$1255
Pro 1.22gb	10ms	3.5"HH	$1335	$1395
GRS•80mb	16ms	2.5"PB	$285	$385
GO•120mb	16ms	2.5"PB	$335	$435

TWO year Warranty. ONE year Warranty on GO drives. FWB™ HDT Formatting Software Included.

TOSHIBA

Formatted Capacity	Speed	Size	Internal	External
877mb	12.5ms	3.5"HH	$999	$1059
1.23gb	12.5ms	3.5"HH	$1239	$1299
213mb	12ms	2.5"PB	$545	$645

Tashiba carries a THREE year Warranty. FWB™ HDT Formatting Software Included.

FUJITSU

SPECIAL! Fujitsu 520mb Int. – $779 –

Formatted Capacity	Speed	Size	Internal	External
513mb *SPECIAL!*	9ms	3.5"HH	$779	$839
1.0gb *SPECIAL!*	9ms	3.5"HH	$1435	$1495
1.03gb	15ms	5.25"FH	$1215	$1315
1.65gb	15ms	5.25"FH	$2195	$2295
2.05gb	12ms	5.25"FH	$2445	$2545

FIVE year Warranty. FWB™ HDT Formatting Software Included.

CONNER "An Apple Authorized Brand"

Formatted Capacity	Speed	Size	Internal	External
82mb	17ms	3.5"TH	$189	$249
160mb	13ms	3.5"TH	$245	$305
206mb	12ms	3.5"TH	$319	$379
515mb	10ms	3.5"HH	$859	$919

TWO year Warranty. FWB™ HDT Formatting Software Included.

MICROPOLIS "Novell Certified"

Formatted Capacity	Speed	Size	Internal	External
698mb	10ms	3.5"HH	$1235	$1295
1.05gb	10ms	3.5"HH	$1335	$1395
2.1gb	12ms	5.25"FH	$2695	$2795

FIVE year Warranty. FWB™ HDT Formatting Software Included.

Maxtor

SPECIAL! 1.15gb 3.5"HH 6300RPM – $1399 –

Formatted Capacity	Speed	Size	Internal	External
120mb	15ms	3.5"TH	$209	$269
203mb	15ms	3.5"TH	$299	$359
325mb	15ms	3.5"HH	$569	$629
520mb /6300 RPM	9ms	3.5"HH	$899	$959
1.15gb/6300 RPM	9ms	3.5"HH	$1399	$1459
1.0gb	13ms	5.25"FH	$1179	$1279
1.43gb	13ms	5.25"FH	$1429	$1529

ONE and TWO year Warranty an 3.5" Drives and TWO Years an 5.25" Drives. FWB™ HDT Formatting Software Included.

MAC SYSTEMS

Duo 210 4/80	$1759
Duo 230 4/80 – 4/120	$2199/$2539
Powerbook 145 4/40 – 4/80	$2049/$2389
Powerbook 160 4/40 – 4/80 – 4/120	$2319/$2659/$2999
Powerbook 180 4/80 – 4/120	$3919/$4269
Powerbook 165 Color 4/80 – 4/120	$3239/$3589
Classic Color 4/80 *SPECIAL!*	$1349
LC III 4/80 – 4/160	$1289/$1429
IIVX 4/80 – 4/230 – 5/80 w/CD-Rom	$1449/$1699/$1899
Centris 610 4/80 w/o Ethernet	$1679
Centris 650 4/80 w/o Ethernet	$2449
Centris 650 8/80 with Ethernet	$2899
Quadra 950 8/0	$4669
Quadra 800 8/230 – 8/500	$4029/$4669
Apple Adjustable Keyboard	$215
Apple 14"/16" Color Monitor	$529/$1279
StyleWriter II	$339
Apple LaserWriter Pro 600/630	$1999/$2419
Apple Color Printer	$2239

POWERBOOK/DUO ACCESSORIES

Powerbooks:	
PowerBook Cables (HDI 30-25 or 50)	$35
Radius PowerView	$489
External Battery Recharger for PowerBook	$149
PowerBook Battery	$79
PowerPad-Sophisticated Circuits	$79
Auto Power Adapter/Empire Engineering	$89
GCC WriteMove II Printer	$499
AE AxCell (Cellular Phone Interface)	$270
AE DataLink PB	$473
AE Powerbook Auto Adapter	$66
E-Mach PowerLink Presenter	$479
Duos:	
Duo Floppy Adapter	$135
HDI-20 Ext. 1.44mb Floppy Drive	$199
Duo A/C Adapter	$69
Duo Rechargable Battery	$69
Duo Dock	$975
Apple Mouse II	$79
Carrying Cases:	
I/O Design Ultimate SL/EX - nylon	$69/$79

For memary see Macintash SIMMS section on next page, and for 2.5" drives see Quantum and Tashiba section above.

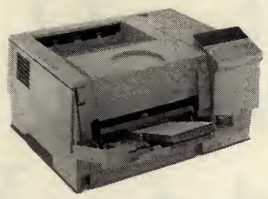
Mac&PC, USA is your true Macintosh Mail-Order Store. Geared to avid Mac users, we offer a diverse product mix to meet the most demanding Customer needs. Also, all of our storage drives are pre-tested to insure your products will be in working order. Technical Problem? We don't consider the sale final when the product arrives at your door. Our technical experts, available at 1-800-392-5818, are conscientious and dedicated to your technical needs. We strive for 100% Customer Satisfaction and that translates to rapid response, minimized down time and unsurpassed follow-up.

NEC

MultiSync 3FGx – 15" Monitor	$615
MultiSync 4FG – 15" Monitor	$735
MultiSync 5FGe ***NEW!*** – 17" Monitor	$1145
MultiSync 5FG – 17" Monitor	$1305
MultiSync 6FG – 21" Monitor	$2355
FG8x 8-bit board	$645
FG24x 24-bit board	$1205
FG24xp 24-bit board	$505
CD-Express	$355
CD-ROM CDR-74	$625
Multi-Media Gallery	$805
SilentWriter 95F Printer	$1289
SilentWriter 95FX Printer	$1529
SilentWriter 97F Printer	$1569
SilentWriter 97FX Printer	$1809
ColorMate PS-40 Color Printer	$3399
2mb upgrade for printers	$95

NEC MultiSync 5FG Monitor
- 17" Multi-Frequency Color Monitor
- AccuColor Control System
- Up to 1024x768 resolution

MacUser August 1992 — **$1305**



NEC SilentWriter Model 95f Laser Printer
- PostScript Level 2
- Envelope feeder and cassette included
- 6ppm/300dpi/2mb RAM

MacUser September 1992 — **$1289**

NEC CDR-74 CD-ROM Reader
- 280ms access time
- Photo-CD/Multisession compatible
- 2-year warranty

MacUser March1993 — **$625**

*– Get a **$250 rebate** from NEC with the purchase of any printer. Offer ends 6/30/93 –*

*– Get a **$100 rebate** from NEC with the purchase of a MacFG 24XP card with either a 15" or 17" MultiSync FG monitor. Offer ends 6/30/93 –*

VIDEO

SUPERMAC

Thunder II/Thunder II Light	$4249/$3149
ThunderStorm Pro	$3149
ThunderLight	$2049
Spectrum/24 Series IV	$849
Thunder 8	$1279
Spectrum/8.24 PDQ	$849
Spectrum/8.24	$599
Spectrum/8 LC-SI/NUBUS	$509/$429
SuperMatch 20" Trinitron	$3399
SuperMatch 21" TPD Color	$2549
SuperMatch 20" DM Trinitron/SuperMatch 20-T MM Trinitron	$2549
SuperMatch 20" Color	$1529
SuperMatch 17" MM Color	$1189
SuperMatch 17-T Trinitron	$1099
Platinum 21" TPD	$1019
Platinum 20" TPD	$939
Spigot & Sound/Spigot & Sound Pro	$499/$1189

RasterOps

21" Mono/Gray-Scale Monitor	$999
21" Color Hitachi	$2569
20" Color Trinitron MultiScan RO	$2349
20" Color Hitachi MulitScan	$1339
24 STV Interface	$769
24 SX Interface	$619
24 XLI Interface	$1929
Paintboard 24/Paintboard LI	$1549/$829

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IntelliColor Display/20 ***NEW!***	$2689
PrecisionColor Display/20s	$2399
PrecisionColor 19	$2099
PrecisionColor Pivot	$969
PrecisionColor 24XK Interface	$839
PrecisionColor 24XP Interface	$499
PrecisionColor 8XJ Interface	$499
VideoVision (Basic)	$1679
VideoVision (Presentation)	$1999
Rockets 25i/Rockets 33	$999/$1479
RocketShare/SCSI-2 Booster	$419/$249

SONY

1430 - 14" Color Trinitron	$669
1320LC - 14" Color Trinitron for LC	$429
1604S - 16" Color Trinitron	$1089

Includes MAC Adaptor. Quadra compatible.

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ColorPage T16 II	$1409
Futura SX - 24 bit accelerated	$509
Double Color SX - 8 bit accelerated	$379
PowerLink Presentor	$479

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Wacom

6x8 Artz	$309
6x9 Standard Tablet	$462
12x12 Standard Tablet	$660
12x12 ElectroStatic Tablet	$726
12x18 Standard Tablet	$990
12x18 ElectroStatic Tablet	$1058

MACINTOSH SIMMS

1x8/2x8/4x8/16x8 @ 80ns	$35/$65/$135/$545
Quadra 700/950	
4x8/16x8	$135/$545
Powerbook 140/170	
4mb/6mb/8mb	$159/$255/$355
Powerbook 160/180	
4mb/6mb/8mb/10mb	$195/$275/$385/$445
Duo 210/230	
4mb/6mb/8mb/10mb	$210/$299/$399/$499
PC 1x9/4x9	$39/$139
Co-Processors 16MHz for LC-LCII/20MHz for SI	$59/$119
NEW 32-BIT SIMMS	
4x8/8x8/16x8 @ 70ns – Centris & LCIII	$139/$269/$535
4x8/8x8/16x8 @ 60ns – Quadra 800	$149/$289/$699

Please be aware that SIMM prices are changing on a daily basis.

PRINTERS

GCC TECHNOLOGIES

WriteMove II	$499
WriteImpact 24-Pin	$499
PLPII 1mb/4ppm/300dpi	$799
BLPII 2mb/4ppm/300dpi	$1499
BLP Elite 2mb/4ppm/300dpi	$1149
WideWriter 360 512k/360dpi	$1399

HEWLETT PACKARD

Deskwriter	$409
Deskwriter 550-C	$769
LaserJet 4M	$1999

Dataproducts

The high performance printer people.™

Dataproducts LZR 1560	$2999

Two Trays: Letter and Legal. 15ppm/300-400dpi with 4mb RAM upgradeable to 8mb. Postscript Level 2.

4mb RAM upgrade	$349
Toner	$289

TEXAS INSTRUMENTS

Microlaser Plus PS-17 with Appletalk	$1179
Microlaser Plus PS-35 with Appletalk	$1299
Microlaser Turbo with Appletalk	$1459
AppleTalk Kit	$49
1mb upgrade for PS-17/PS-35/Turbo	$49
Toner Cartridge	$49

SCANNERS

UMAX

UC - 1200s with Adobe PhotoShop™ v2.5 FV	$2989
UC - 840 with Adobe PhotoShop™ v2.5 FV	$1289
UC - 630 with Adobe PhotoShop™ v2.5 FV	$1089
UG - 630 with Typereader OCR	$889
Automatic Document Feeder	$489
Transparency / Slide Scanner Option	$689

AGFA

Arcus 1200dpi Scanner	$CALL
Arcus Transparency option	$CALL

SHARP

JX-320 ***SUPER SPECIAL!***	$899
JX-450	$3899
JX-610	$9899

All scanners come bundled with Adobe Photoshop v.2.5 and Mac Kit.

MODEMS

US Robotics

Mac&Fax SPORTSTER Modem 14.4bps, Send/Receive FAX Modem	
SUPER SPECIAL!	$249
WorldPort FAX	$459
Courier v.32 bis (Data only)*	$399
Courier v.32 w/FAX*	$419

**Includes cable*

Global Village

TelePort Bronze 24/96	$179
TelePort Silver 96/96	$359
TelePort Gold 14.4/14.4	$419
PowerPort Bronze 24/96	$189
PowerPort Silver 96/96	$359
PowerPort Gold 14.4/96	$419

PSI

COMstation One	$135
COMstation Two	$235
COMstation Four	$345
COMstation Five	$415
PowerModem I	$125
PowerModem II	$225
PowerModem III	$315
PowerModem IV ***SUPER SPECIAL!***	$375

SPECIAL! Power Modem IV – $375 – *while supplies last*

NETWORK

ASANTÉ

MC3NB - Thick/Thin/10 Base T, 64k	$199
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Maxtor MXT540	520MB	9ms	6300 RPM	3.5" *	$1039	$ 949	2 years
Maxtor MXT1240	1150MB	9ms	6300 RPM	3.5"	$1539	$1449	3 years
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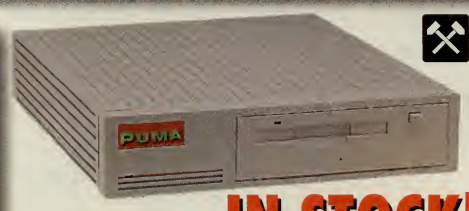

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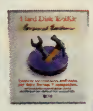

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UTI0135 Fax*FACTS 6806* $139.

MacEKG 2.0

(Micromat) This *preventative maintenance* utility is for *everyone* who owns a Mac Plus or above (System 6.0.7 or greater). Once installed, it runs by itself. MacEKG actually learns your machine and how it should behave. If a significant change has occurred, EKG will inform you by voice and indicate problems worth investigating. Is your disk drive slowly dying out on you? In only a few minutes EKG has determined the health of your machine and System Folder for the day. EKG helps with inventory control by logging NuBus, ADB, and over 250 System configuration parameters. The program also includes ReActivator, component-level tests previously available only to Authorized Apple technicians, and a unique "capsule" to export for remote diagnostic analysis.
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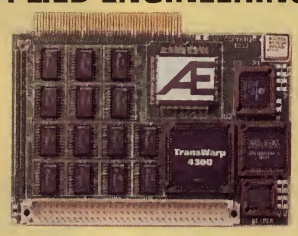

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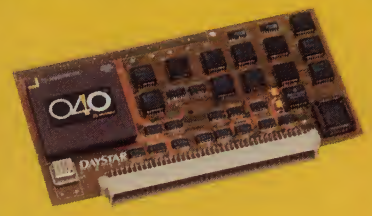

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MAC CLASSIC	•		•									•		•
CLASSIC II, LC, LCII	•	•		•										
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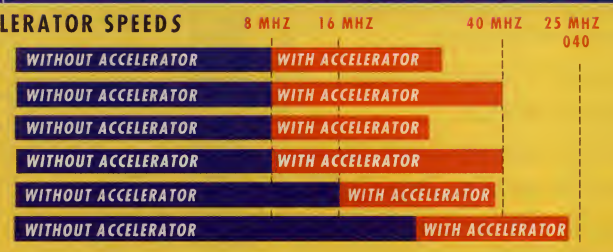

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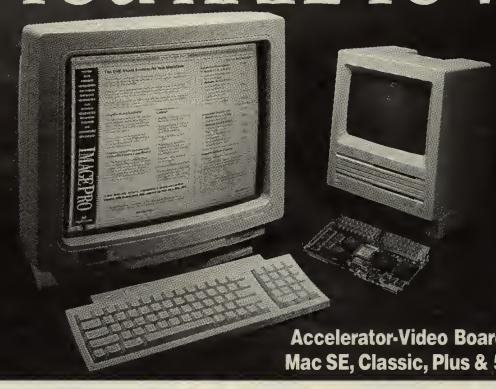

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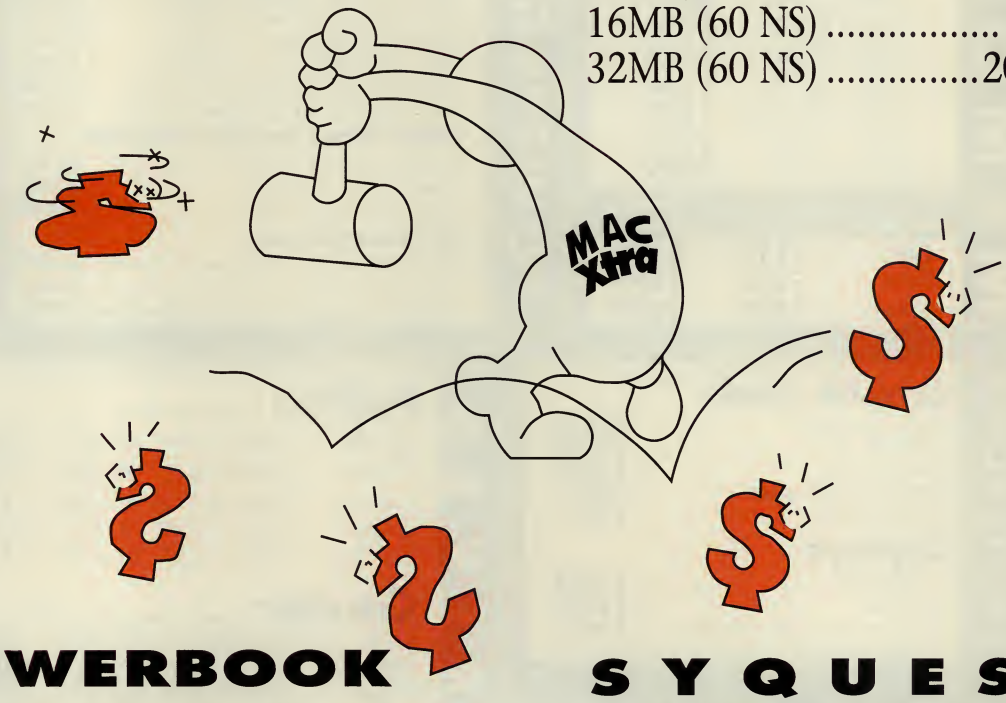

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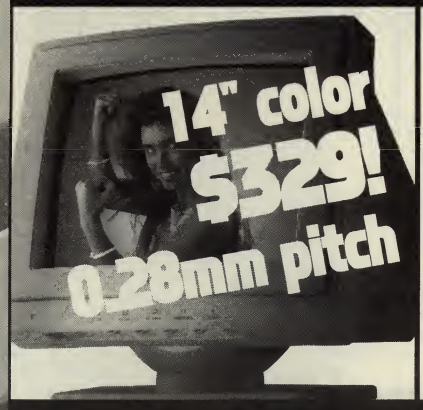

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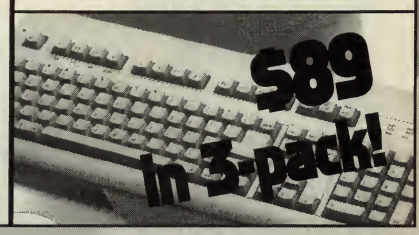

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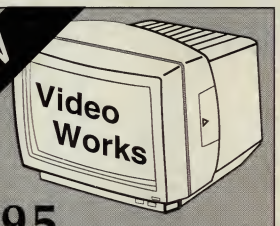

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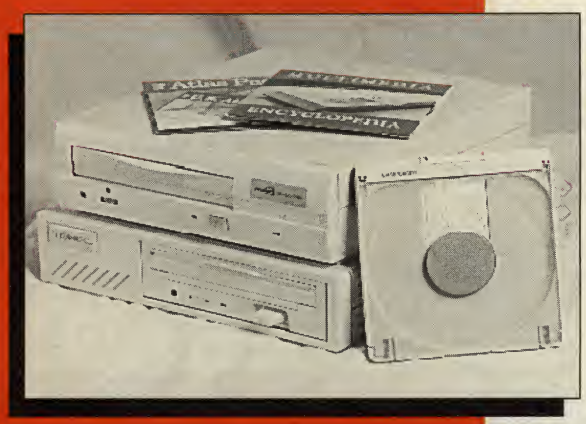

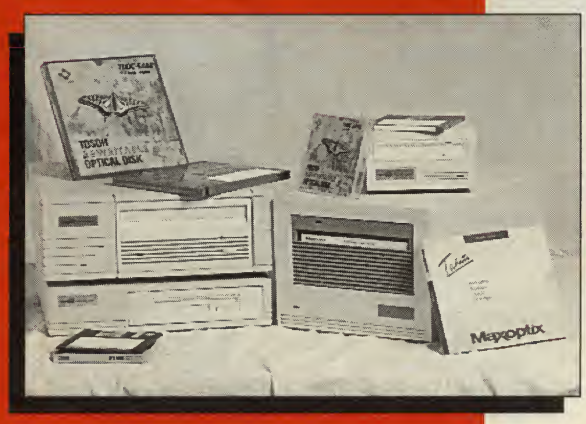

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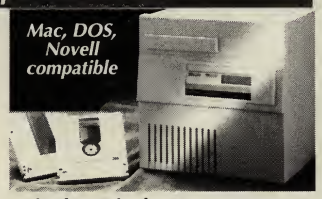

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Multisession Toshiba XM3401B. Fast 200 milliseconds average access. *Full audio control via software is provided by the* ***Music Box*** *software. Includes sample CD.*

Texel Multisession CD-ROM ... 499
Texel DM3024*. This is a performance drive with 235 ms average access and double the normal speed - 300 KBytes/sec. data transfer. Kodak Photo-CD compatible!*

CD-ROM – Single Session

Toshiba XM3301B	459

Fast 325 ms average access time, 150 KBytes/sec. Sustained data transfer rate.

Chinon 435	399

350 ms average access time,150 KBytes/sec. Sustained data transfer rate 64KB Data Buffer.

Multi-Disk:

Pioneer 6-Disc DRM-600A	799
DRM-604X (600K/Sec. Transfer Rate)	1,299

More than 3 Gig of Data On-Line! Compatible with SUN, IBM and Macintosh. Can even be used as a CD-Audio jukebox! Full audio control via software is optional with ***Music Box*** *software . Includes SCSI cable, Mac software, and sample CD-ROM.*

PostScript Printers

Sharp 600 dpi Printer $1,199

Grayscale:

Sharp	1,199

600 dpi Engine, 8 ppm, RISC Processor, AppleTalk on-board. Scalable typefaces (PostScript and PCL5) generating thousands of fonts. Printer emulations include Hewlett Packard, IBM ProPrinter & Epson. Parallel and serial interface with automatic sensing. 2 MB RAM (expandable to 8MB).

Color:

Océ G5241	1,999

The Océ G5241 puts the power of color PostScript® printing on your desktop using a true Adobe® PostScript interpreter. Using the thermal transfer method, the G5241 prints either 3 or 4 color on letter or A3 size, paper or overhead transparencies at 300 dpi.

Océ G5232	2,999

The Océ G5232 has all the great qualities of the G5241 but increases the printing capability to tabloid size pages at 300 dpi. True PostScript®, 35 Adobe fonts in ROM, downloadable fonts supported. 8Mb Ram, 20Mb hard drive.

Modems

SupraFAX Modem v.32bis 14,400	299

14,400 bps Modem/14,400 send-receive FAX. v.42bis compression for up to 57,600 bps data.

SupraFAX Modem Plus 2,400	199

2,400 bps Modem/9,600 send-receive FAX. v.42bis data compression for up to 9,600 bps data.

All SupraFAX modems include STF and MicroPhone software, cable and have a 5-year Warranty

U.S. Robotics Sportster 14,400	249

Now your Mac can be a fax and a data modem, too, and with U.S. Robotics reliability built in. 14,400 CCITT V.32 bis with V.42 bis– 14,400 bps throughput, com-patible with 300, 1200, 2400, and 9600 bps CCITT standards, 9,600 bps send and receive Group III Fax, V.42/MNP 2-4 error control and V.42 bis/MNP 5 data compression.

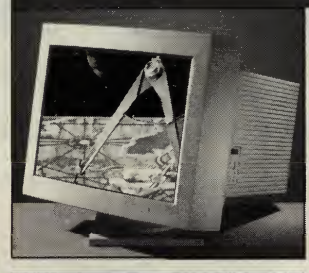
Quicktel v.32bis 14,400	269

14,400 bps Modem/14,400 send-receive FAX. v.42bis compression for up to 57,600 bps data.

Quicktel 2400/9600 FAX/Modem	139

2,400 bps Modem/9,600 send-receive FAX. v.42bis compression for up to 9,600 bps data. Incl. software.

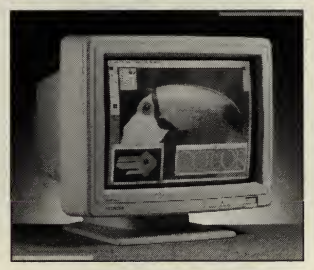
Video Monitors & Packages



20 Inch Color Trinitron! $1,599

Monitor Only	1,599
Business Package* 256 Color	1,799
Artist Package* 16 Million Color	2,449

** Package includes a new 20" Relax Mac compatible Trinitron color monitor, video board, and cable. 72 dpi for WYSIWYG.*



20 Inch Hitachi 256 Color Monitor! $799

Monitor Only	799
Business Package* 256 Color	999
Artist Package* 16 Million Color	1,649

** Package includes a new 20" Hitachi Mac compatible color monitor, video board, and cable. 72 dpi for WYSIWYG.*

14 Inch 256 Color Monitor! $359

Monitor Only	359
8 - Bit Package 256 Color	499

Compatible with Macintosh On-Board Video- LC, LCII, si, ci and Quadra 900/950.

Grayscale:

Sampo Monitor Only	599
Mac II, x, fx, cx, ci Package *	799
Mac LC, LCII, SE/30 Package*	999
Ikegami Monitor Only	799
Mac II, x, fx, cx, ci Package *	999
Mac LC, LCII, SE/30 Package*	1,199

** Package includes a new 20" Mac compatible grayscale monitor, video board, and cable. 72 dpi for WYSIWYG.*

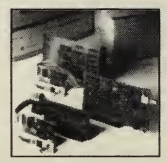
20 Inch Sampo 256 Grayscale Monitor! $599

RasterOps:

Editing Aces	3,499
24STV - Multi Media	769
MoviePak	1,499
24XLTV Multi Media	2,639
24MxTV Multi Media	1,649
MediaTime Multi M.	1,499
ProColor 32	3,149
24XLi	1,889
PaintBoard Li	815
8XL	499
ClearVue/Classic	299
ClearVue/LC	299
Sweet 16" Monitor	1,249

Ethernet / Network

Asanté MacCon3 - 64K	189
Asanté MacCon+ - 64K	149
Asanté FriendlyNet Adapters	69
Asanté 10BaseT Hub/8	239
Asanté 10BaseT Hub/12	479
AsantéHub 1012	1,379
Asanté Print	34



Case Kits

Cases are Made by Relax In the U.S.A.

Half Height ..3.5" or 5.25"	89
Half Height..with front cut out	89

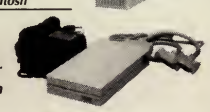
With 35 watt power supply, prw cable, fan, SCSI ID.

Full Height for 5.25" Drive with front cut out	119

With 55 watt power supply, prw cable, fan, SCSI ID.

Sierra 3.5" 89
Includes SCSI cable, SCSI ID & Power Supply For PowerBook or any Macintosh

Portable Case Kit for PowerBook or any Macintosh



Includes SCSI cable & power supply

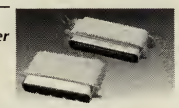
Pocket 3.5" Low Profile	89
Pocket 2.5" Low Profile	89

Cables/Terminators

Hi-Quality Molded SCSI Cables

2' AppleDB25 to Cent.50M	9
2' Cent.50M to Cent.50M	19
6' Cent.50M to Cent.50M	29

TermiGard LED Termination Power Indicators The Best you can buy!



Standard Single Ended Cent50	9
Active Single Ended Cent50	29

Macintosh Video Cables for On-Board Video or Most Monitor Brands

Mac 15 pin to RGB	39
Quadra/Centra 16" or 21"	49

Premium Hard Disk Drives

Seagate

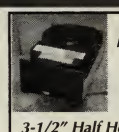
3-1/2" Half Height	Internal	External
510 Meg. - ST1581N, 14 ms.	939	999
1.0 Gig. - ST11200N, 14 ms.	1,149	1,209
5-1/4" Full Height - WREN		
1.0 Gig. - ST41200N, 15 ms.	1,149	1,249
1.4 Gig. - ST41651N, 15 ms.	1,349	1,449
1.9 Gig. - ST42100N, 12.9 ms.	1,725	1,825
5-1/4" Full Height - ELITE Ultra-High Performance		
1.4 Gig. - ELITE-I, 11.5 ms.	1,825	1,925
2.1 Gig. - ELITE-II, 11 ms.	2,449	2,549
3.5 Gig. - ELITE-III, 11 ms.	3,149	3,249

Fujitsu

3-1/2" Half Height		
520 Meg. - 2624FA, 9 ms.	839	899
1.2 Gig. - 2694SA, 8.5 ms.	1,545	1,605
5-1/4" Full Height		
1.2 Gig. - 2266SA, 11.5 ms	1,245	1,345
2.0 Gig. - 2652SA, 11.5 ms	2,245	2,345

Maxtor

3-1/2" Low Profile/Low Power		
120 Meg. - 7120S, 15 ms.	209	269
213 Meg. - 7213S, 15 ms.	299	359
5-1/4" Full Height		
645 Meg. - XT8760S, 16.5 ms.	949	1,099
1.7 Gig. - Panther, 13 ms.	1,449	1,549



Hitachi 3.5 Gig. $2,999
12.8 ms av. access
DK-517C-37
External Model $3,099

3-1/2" Half Height	Internal	External
1.4 Gig. - DK-315C-14, 11.8 ms.	1,399	1,459
5-1/4" Full Height		
3.5 Gig. - DK-517C-37, 12.8 ms.	2,999	3,099

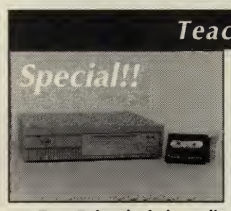
Conner

3-1/2" Half Height	Internal	External
42 Meg. - CP-3040, 25 ms.	179	239
85 Meg. - CP-30080E, 17 ms.	195	255
120 Meg. - CP30100, 19 ms.	259	319
170 Meg. - CP-30170E, 17 ms.	275	335
212 Meg. - CP-30200, 12 ms.	355	415
545 Meg. - CP-30540, 8.5 ms.	895	919

Quantum

3-1/2" ELS Low Profile		
42 Meg. - ELS42, 19 ms.	169	229
85 Meg. - ELS85, 17 ms.	195	255
127 Meg. - ELS127, 17 ms.	229	289
3-1/2" PDS, PRO & LPS Series		
240 Meg. - LPS240, 10 ms.	339	399
525 meg. - LPS525, 10 ms.	869	929
1.0 Gig. - PD1050S, 11 ms.	1,239	1,279
1.2 Gig. - PD1225S, 11 ms.	1,359	1,419
2-1/2" - Internal for the Mac PowerBook only		
80 Meg.- Go•Drive GRS80,17 ms.	289	389
120 Meg.- GRS120, 17 ms.	339	439
160 Meg.- GRS160, 17 ms.	489	589

Teac, DAT and ExaByte Tape Drives



2.0 Gig. Wang DAT Tape
Retrospect software & tape included!
$999

Tape Drives include media, software and cables!

Tape Drives:

160 Meg. Tape Vista - TEAC	449
250 Meg. Tape Vista - Archive	599
600 Meg. Tape Vista - TEAC	649

DAT & Exabyte Drives Include media, Cables and Retrospect Software.

DAT 4 mm Drives:

2.0 Gig. DAT Sierra - Archive	1,069
2.0 Gig. DAT Sierra - ExaByte DAT	1,199
2.0 Gig. DAT - Hewlett Packard	1,399

Relax 600 Meg. Tape Drive .. 649

Selected for performance, value and service. Quality at low cost. Perfect for backing up hard disks up to 600 megabytes. Complete package includes software, cables and media. MACWORLD *- 12/92.*

MACWORLD MW EDITORS' CHOICE

Compression DAT 4 mm Drives:

8.0 Gig. DAT Sierra - Archive	1,359
8.0 Gig. DAT Sierra - ExaByte DAT	1,499
8.0 Gig. DAT - Hewlett Packard	1,549

ExaByte Helical Scan 8 mm Drives:

2.2 Gig. Tape Vista - ExaByte 8200	1,799
5.0 Gig. Tape Vista - ExaByte 8500	2,839

Memory

Mac II, IIx, IIcx, IIci & Quadra:

Classic 3 Meg. Card w/1 Meg.	49
1 Meg.- 1M x 8 - 120, 100, 70	26, 29, 32
2, 4, 8 Meg. x 8 - 80	59, 129, 279
4 Meg. - 4M x 8 - 70	129

Mac IIfx:

4 Meg. - 4M x 8 - 70 (IIfx)	149
8, 16 Meg. x 8 - 80 (IIfx)	299, 555

Mac Centris, Color Classic, LCIII, Quadra 800

1, 2 Meg. x 32 - 70 (72pin)	129, 259
1, 2 Meg. x 32 - 60 (72pin)	139, 269
4, 8 Meg. x 8 - 70 (72pin)	159, 329
4, 8 Meg. x 8 - 60 (72pin)	189, 369

Video Memory:

Quadra 700/900/950 256K Video SIMM	29

Mac Powerbook:

Powerbook 100 - 4, 6 Meg.	179, 229
Powerbook 140/170 - 4, 6 Meg.	159, 219
Powerbook 160/180 - 6 Meg.	249
PowerBook 160/180 - 8,10 Meg.	349, 449
Powerbook 210/230 - 8, 10 Meg.	399, Call
PowerBook 12-Hour Battery Pack	49

All SIMMS have a limited lifetime warranty! Call for latest prices!

Color Scanners

Tamarack Color Scanners:

6000C 600 dpi	999
Slide Attachment 6000/8000(shown)	549
8000C 800 dpi	1199
12000C 1200 dpi	1299
Slide Attachment 12000	649

All ArtiScan series include PhotoShop 2.5

Relax Color: (Epson Engine)

24-Bit Color Scanner - 8.5" x 11"	
300 dpi - 110 VAC	949
300 dpi - 220 VAC	1,099
Color Studio LE (limited version)*	79
Color Studio 1.5 (full version)*	159

Sharp Color Scanner:

JX-320** - 8.5" x 11"	
24-Bit 600 dpi w/PhotoShop	999
Transparency/Slide Attachment	799

Umax Color Scanners:

UC630** - 8.5" x 14"	
24-Bit 600 dpi w/PhotoShop	1,079
Transparency/Slide Attachment	789
Auto Document Feeder	479
UC1200S** - 8.5" x 14"	
24-Bit 1,200 dpi w/PhotoShop	2,999
Transparency/Slide Attachment	889

Relisys Color Scanner:

ColdScan 800 - 8.5" x 14"	
24-Bit 800 dpi	1,099
PhotoShop LE (limited version)*	99
PhotoShop 2.0 (full version)*	199

** with purchase of scanner, ** includes PhotoShop*

660 Meg. WREN Runner	1,149
1.0 Gig. Maxtor Panther	1,149

Rewritable Optical Drive:

1.0 Gig. Maxoptix Tahiti-I	1,999

Factory reconditioned - 1-year warranty

(Prices are for internal hard disk drives models. For an external case add $60.)

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20 Meg. Seagate ST325N	89
40 Meg. Maxtor 7040S	159
80 Meg. Maxtor 7080S	185
180 Meg. Fujitsu M2614SA	309
210 Meg. Quantum P210S	319
300 Meg. WREN ST4350NM	549
320 Meg. Fujitsu M2622SA	769
330 Meg. WREN Runner	905
425 Meg. Seagate ST1481N	659
435 Meg. Seagate ST2502NM	669

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• Unformatted Capacity	• Model	• Form Factor	• (ms) • Int.		• Ext.
FUJITSU					
520MB	M2624FA	3.5 HH	9	$799	$859
1.1GB	M2694SA	3.5 HH	8.5	$1529	$1589
1.2GB	M2266SA	5.25 FH	14.5	$1245	$1345
2.0GB	M2652SA	5.25 FH	14.5	$2199	$2299
2.4GB	M2654SA	5.25 FH	14.5	$2399	$2499
• Five year warranty					
QUANTUM					
42MB	ELS42	3.5 1"	19	$169	$229
85MB	ELS85	3.5 1"	17	$195	$249
127MB	ELS127	3.5 1"	17	$229	$285
170MB	ELS170	3.5 1"	17	$259	$309
240MB	LPS240	3.5 1"	10	$339	$395
525MB	LPS525	3.5 1"	10	$869	$929
700MB	PRO700	3.5 HH	10	$1129	$1189
1.0GB	PRO1050	3.5 HH	10	$1249	$1309
1.2GB	PRO1225	3.5 HH	10	$1399	$1459
80MB	Go•Drive	2.5	17	$289	$379
120MB	Go•Drive	2.5	17	$329	$419
• ELS, LPS, PRO drives have two year warranty					
• GO•drives have one year warranty					
SYQUEST				Single	Dual
44MB	IMS 44MB External			$389	$729
88MB	IMS 88MB External			$489	$899
88MB	IMS 88c External	*NEW!*		$589	
44MB	SyQuest SQ400 Cartridge			$64	
88MB	SyQuest SQ800 Cartridge			$99	
• Drives ship with one cartridge					
• Drives have two year warranty					
MAXTOR					
120MB	7120	3.5 1"	15	$215	$280
207MB	7213	3.5 1"	15	$309	$369
330MB	LXT-340	3.5 HH	15	$569	$629
540MB	MXT540SL	3.5 HH	8.5	$899	$959
1.2GB	MXT1240S	3.5 HH	8.5	$1429	$1489
1.2GB	PO-12S	5.25 FH	13	$1149	$1249
1.7GB	P1-17S	5.25 FH	13	$1399	$1499
• 3.5" drives have one year warranty					
• 5.25" drives have two year warranty					
SEAGATE					
1.2GB	ST11200N	3.5 HH	10.5	$1199	$1259
2.1GB	ST42100N	5.25 FH	12.9	$1749	$1849
1.6GB	ST41600N	5.25 FH	11.5	$1839	$1939
2.4GB	ST42400N	5.25 FH	11	$2449	$2549
3.4GB	ST43400N	5.25 FH	11	$3299	$3399
• Drives have one year warranty					
MICROPOLIS					
660MB	1624	5.25 HH	14.5	$1269	$1395
1.0GB	2112	3.5 HH	10	$1689	$1749
2.0GB	1924	5.25 FH	10	$2849	$2949
• Drives have five year warranty					

5 YEAR WARRANTY

SIGMA DESIGNS MONITORS

ColorMax 15
for PowerBook 160, 180 and Duo computers $739

Power Portrait
for Mac Plus, Classic, Classic II, SE, SE/30 & PowerBook computers $619

• Call for information about other Sigma Designs products.

EXTERNAL DRIVE HOUSINGS

Full Height	*$145*
Half Height	*$85*
2.5" Mini Housing	*$99*

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- 110/220 VAC auto switching power supply.
- Full Height cabinet will hold two 3.5" or 5.25" HH drives.

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HDI-30 ~ 50 Centronics	$39
Power Pad (keypad)	$89
PowerBook Memory	(Call)
PowerBook Battery	
for 140/145/160/170/180	$65
Battery Charger	$99

TOSHIBA 205MB HARD DRIVE

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Internal for the PowerBook 2.5" $579

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PowerCache - 33, 40, & 50 MHz Turbocharged Accelerator

"Super performance for ALL software applications." Accelerates everything your computer does. From QuickDraw screen refreshes to spell-checking your documents, the PowerCache turbocharges your computer, transparently."

Classic, Color Classic, SE, SE/30, LC, LC II, II, IIx, IIcx, IIci, IIsi, IIvi, IIvx, Performa 400 and 600 - adapter required for all but the IIci, IIvi, IIvx, and Performa 600.

PowerCache		w/FPU
33MHz	$375	$459
40MHz	$545	$635
50MHz	$715	$845
PowerCache Adapter	$41	

FastCache	
Turbo (128k)	$169
Quadra 700/900	$249
Quadra 700/800/900/950	$375
IIsi (64k)	$279
IIci (64k)	$199

Disk Runner - NEW!!!
"Increase the speed of your drive today!" $599

Turbo 040 Accelerators

Turbo 040	25MHz	$1079
Turbo 040	33MHz	$1329

Charger
"Incredibly fast NuBus application accelerator for Adobe PhotoShop." $869

3 Year Warranty

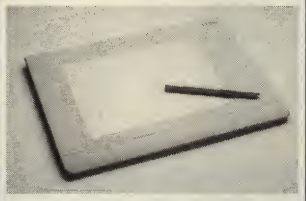
WINNER MacWEEK 1992

• PowerCache & FastCache have 36 month limited warranty.

WACOM

Graphics Tablets

6" x 8" ArtZ ADB Tablet	$309
6" x 9" Standard	$462
12" x 12" Standard	$660
12" x 18" Standard	$990
12" x 18" Electrostatic	$1059



ArtZ tablet w/pressure pen. Works with all Macintosh software applications and is supported by all major pressure-sensitive software applications.

MAGNETO OPTICAL MEDIA CARTRIDGES

600MB	5.25"	**$99**
128MB	3.5"	**$40**

APPLIED ENGINEERING

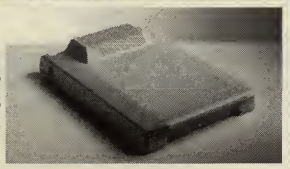
Accelerators

for Mac LC, LCIII, Performa 400, & Color Classic					
TransWarp	4300	40MHz	$369	w/FPU	$505
for Mac SE & SE/30					
TransWarp	1300	25MHz	$185		
TransWarp	1300	40MHz	$249	w/FPU	$409
for Mac Classic					
TransWarp	2300	25MHz	$185		
TransWarp	2300	40MHz	$249	w/FPU	$340

UMAX

Color Scanners

UC630	$1078
UC840	$1248
UC1200	$2999
Transparency Adapter	$709



• UMAX scanners ship with Adobe PhotoShop™ software.

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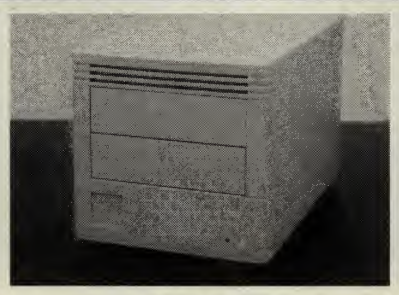
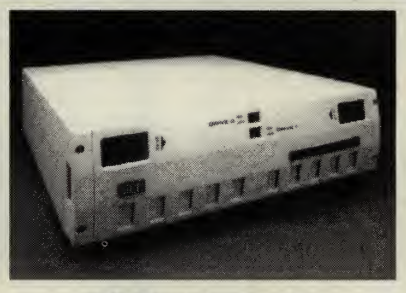
STORAGE SUBSYSTEMS

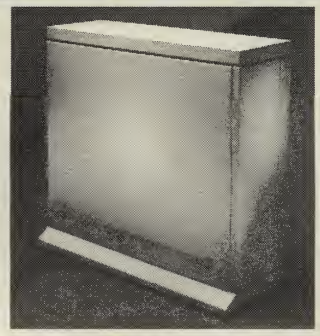
3.5" DISK SUBSYSTEMS



5 1/4" DISK SUBSYSTEMS



REMOVABLE DISK SUBSYSTEMS
2 DRIVES SOLUTION WITH CANISTERS AND SCSI CABLES



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8 DRIVES SOLUTION

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425	M2623FA	3.5	12	$ 714	$814
520	M2624FA	3.5	12	$ 765	$865
1079	M2266S	FH	14	$1189	$1309
1080	M2694FA	3.5	10	$1098	$1198
1750	M2652S	FH	11	$2083	$2199
2061	M2654S	FH	11	$2100	$2220

DEC
5 YEAR WARRANTY

MB	TYPE	SIZE	SEEK	INT.	EXT
850	DSP3085S	3.5	9.5	$1192	$1287
1050	DSP3105S	3.5	9.5	$1158	$1253
1660	DSP3160S	3.5	10	$1752	$1847
2000	DSP5200S	FH	12.5	$1904	$2024
3500	DSP5350S	FH	11.5	$3246	$3366

MICROPOLIS
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MB	TYPE	SIZE	SEEK	INT.	EXT
560	2105	3.5	10	$956	$1056
698	2108	3.5	10	$1093	$1193
667	1624	HH	15	$1029	$1080
1050	2112	3.5	10	$1119	$1214
1340	1528	FH	14.5	$1312	$1432
1380	1908	FH	11.5	$1812	$1932
2100	1924	FH	11.5	$2369	$2489
3050	1936	FH	11	$3000	$3130

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456	ST3550N	1"	12	$ 815	$ 915
540	ST3600N	1"	10.5	$ 855	$ 955
665	ST4767N	FH	12	$1025	$1125
*860	ST1980N	3.5	9.9	$977	$1077
1037	ST41200N	FH	16	$1047	$1147
*1037	ST11200N	3.5	10.5	$1020	$1115
1420	ST41650N	FH	15	$1228	$1348
1420	ST41600N	FH	11.5	$1695	$1815
*1900	ST42100N	FH	12.9	$1580	$1700
*2100	ST42400N	FH	11	$2217	$2337
*2900	ST43400N	FH	11	$2808	$2928

SPECIALS

TYPE	MB	SIZE	SEEK	INT.	EXT.
Fujitsu	520	3.5"	12	$ 770	$ 870
Seagate	1.04GB	3.5"	10	$1169	$1250
Fujitsu"Optical"	128	3.5"	30	$1020	$1130
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540	LXT540SY	3.5	8.5	$ 899	$995
1240	1240S	3.5	8.5	$1322	$1417
1059	P0-12S	FH	13	$1045	$1165
1345	P1-17S	FH	13	$1265	$1385

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1050	PD1050S	3.5	10	$1205	$1300
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Source: MacWeek 1992 Study of Microcomputer Product Ownership and Buying Plans

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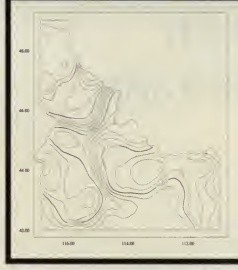

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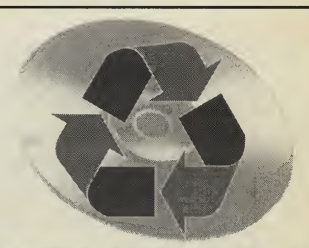

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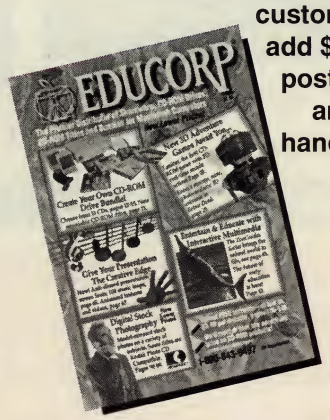

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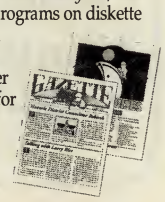

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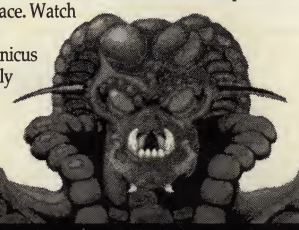

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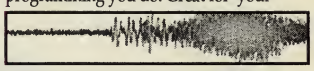

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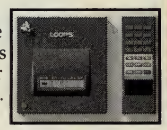

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When asked to name the top Macintosh magazine, MacWEEK wins!
Volume Buyers polled prefer MacWEEK over competing Macintosh publications. If only allowed one Mac publication, more Volume Buyers would choose MacWEEK as their sole information source to make buying decisions.

Source: GCC Technologies Best Customer Study, August 1990

Open Systems

From Page 1

That would allow Unix developers to create their own applications that incorporate the Mac interface and such system services as QuickDraw GX, QuickTime, AppleShare and AOCE (Apple Open Collaboration Environment).

Apple said it has not yet determined the precise features it will support on each Unix platform, what performance levels it expects to achieve, or when and how it will deliver its software services. Depending on the outcome of negotiations with the Unix vendors, the Mac services could be bundled with the workstations or offered by either Apple or the Unix vendors as a shrink-wrapped option.

Analysts said Apple's plan to support Mac applications — and the enthusiastic response it won from Unix vendors last week — is the latest industry response to a growing fear of Microsoft Corp.'s dominance in the computing landscape.

The Redmond, Wash., software developer is touting its upcoming Windows NT as an alternative to Unix, claiming that it combines the virtues of an industrial-strength OS with something Unix still lacks — the ability to run thousands of easy-to-use productivity programs. Offering their customers the chance to run Mac applications could help Unix vendors withstand the NT challenge.

The move could also eventually let Mac users run their applications on higher-performance hardware than is now available from Apple. Some corporate sites with significant Mac installations said they were buoyed by the prospect.

"To develop serious business applications in cross-platform environments, we need a gutsy OS that provides multitasking and multithreading," said Tom Unkefer, who, as director of technology management for LTV Steel Co. of Cleveland, oversees a network of 2,300 Intel-based computers and Macs and a smattering of Unix machines. Unkefer said if Apple hadn't announced its open-systems strategy, he would have looked elsewhere for Unix solutions.

Apple said that it cannot promise 100 percent compatibility with all Mac software on the Unix systems. Extensions and control panels, for example, will probably not be supported. Officials said the company is evaluating the 20 to 30 most popular Mac applications to decide which features are critical.

The new plan is based on work done at ESD to enable the Finder and other off-the-shelf Mac applications to run under PowerOpen, the new IBM-Apple Unix implementation for the PowerPC. The software to be offered for the Sun and HP systems will include a software emulation of the 68040 and a version of the Mac ROMs and Toolbox translated via FlashPort, the binary translation system developed by Echo Logic Inc. of Holmdel, N.J.

Apple officials said they are working closely with Echo Logic and the workstation vendors to enable FlashPort to generate native code for the Sun and HP RISC systems. □

Apple swats Mac Easy Open bugs

Cupertino, Calif. — Apple this month began distributing a new version of its Macintosh Easy Open system extension to third-party developers.

Like the previous version, Easy Open 1.0.2 suggests programs capable of opening a document if the file's native application cannot be found.

Version 1.0.2 adds support for the Japanese version of System 7. A bug in the extension's scrap-translation feature has been fixed. The update also rebuilds RAM-disk desktops more reliably and selects alternative programs more accurately.

Easy Open ships with third-party document-conversion utilities, such as DataViz Inc.'s MacLinkPlus Translators. Upgrades will be available from those third-party distributors and APDA. □

Screenscapes improves view from desktop

Santa Barbara, Calif. — Competition in the screen-saver arena may have subsided, but it's intensifying in the desktop-pattern editor market.

The latest entry in the desktop diversion category is Screenscapes, a pattern editor released this month by Kiwi Software Inc. The program ships with more than 650 professionally designed patterns.

In addition, users can create new patterns and apply special effects to existing ones; import images via the Clipboard; and translate pattern files in ppat, Chameleon and Wallpaper formats.

The program is an application rather than an extension, yet it preserves the user's pattern selection without modifying the system file. Instead, it creates a script that installs the pattern in memory each time the machine is started up.

Kiwi said it is not specifying a suggested retail price but expects the program to sell for about $43. The company offers a 60-day money-back guarantee.

Kiwi Software Inc. is at 6546 Pardall Road, Santa Barbara, Calif. 93117. Phone (805) 685-4031; fax (805) 968-1932. □

Screenscapes, the latest entry in the desktop-pattern editor market, features more than 650 professionally designed patterns. Users can preview a folder full of patterns in one window.

Apple tells developers: Go native with PowerPC

By Henry Norr

San Jose, Calif. — Predicting that it will sell 1 million PowerPC-based Macs next year, Apple last week urged developers to "go native" and brought forward a lineup of key developers who have already bought the message.

Several prototype machines incorporating the new RISC processor were shown at the Apple Worldwide Developers Conference here, including at least one running an 80-MHz version of PowerPC 601, the first member of the new RISC family. So far, the chip's manufacturers, Motorola Inc. and IBM Corp., have announced only 50- and 66-MHz versions of the 601, and Apple officials insisted that last week's display was only a "technology demonstration." Sources said, however, that Apple's partners in the project will announce a version of the chip running at about the 80-MHz mark within the next few months.

Eleven developers publicly promised to offer native-mode products, which will enable users to take full advantage of the new processor's power. The list included ACI US Inc., Adobe Systems Inc., Aldus Corp., Claris Corp., Deneba Software, Frame Technology Corp., Insignia Solutions Inc., Microsoft Corp., Quark Inc., Specular International Ltd. and WordPerfect Corp.

Partially complete PowerPC versions of several programs were shown at the developers meeting. The star of the show, according to attendees, was a native-mode version of Aldus FreeHand.

In an effort to reassure customers that buying a 680x0-based Mac is not a dead end, Apple promised to deliver upgrades to the PowerPC for the Mac IIvi and IIvx, Performa 600, Centris 610 and 650, and Quadra 800. Officials said they hoped to deliver upgrade logic boards for those systems shortly after new PowerPC-based Macs are released early next year, but they declined to provide any specifics about timing or price.

In addition, Apple said in a statement, "Apple and third-party developers are working to create upgrade paths for other Macintosh models as well." Several accelerator makers said Apple has approached them about building PowerPC cards for other 680x0-based machines. □

Amber

From Page 1

The new standard, according to Apple, will allow an unprecedented degree of customization by users and developers.

Developers will be encouraged to turn their monolithic applications into packages of focused tools (also known as components, or parts editors). Once they do so, users with special requirements or preferences will be able to replace or supplement any of the parts with alternative tools.

To create packages for vertical markets and other specific user categories, developers won't need to create and support separate applications; they will be able to combine their components and others licensed from other developers into a variety of special-purpose packages.

Microsoft's OLE (Object Linking and Embedding) 2.0 specification, which Mac developers recently received, offers some of the same capabilities, including support for multiple data types and in-place editing. But Apple officials pointedly contrasted their technology and business approach to Microsoft's: OLE 2.0 works only on individual machines, while Amber will support links across networks. And while OLE is controlled entirely by Microsoft, Apple officials said they will make Amber an open standard; the company will offer the specification and source code to all developers on any platform, without restriction as to how it is used. A nonprofit organization will be set up to promote cooperation around the standard and to certify interoperability between different implementations.

Amber itself, however, will be fully interoperable with OLE 2.0, Apple said. Users will be able to plug data created with OLE 2.0-compatible applications from Microsoft and third parties into Amber documents, and vice versa. Developers who implement Amber won't have to do anything else to implement OLE 2.0.

Amber's storage model is based on the Bento document-content standard Apple developed last year (see MacWEEK, Jan. 15, 1992). It can track multiple versions of a document by writing multiple representations of a single part. Users will also be able to use alternative storage systems, such as Lotus Notes, which stores objects in its databases.

The linking mechanism, although based in part on System 7's publish and subscribe, provides a much simpler interface and doesn't require the separate edition files. To create dynamic links between documents, users simply select a new Paste As Link command on the Edit menu in Amber-compliant applications. It will rely on AppleScript and compatible scripting languages for some of its functionality.

Microsoft said it hopes developers won't want to wait for Amber. "We will be shipping OLE 2.0 this summer," said Ben Waldman, manager of Macintosh technology at Microsoft. "The information is out there now, and the code is working. If developers support OLE, they'll be able to support compound documents one year earlier. We need to address users' needs as soon as possible."

Developers said they are excited by the promise of both OLE and Amber. "When you see [OLE 2.0/] working, it's a cool thing," said Nick Gault, president of No Hands Software Inc. of Belmont, Calif. "Apple feels like it has to have an answer to it."

It may take a while, however, for users to see all the benefits of OLE and Amber. "For now the value of this technology is that it allows for much better embedding and data sharing across applications," Gault said. "Over time, you'll see that naturally evolve into people writing smaller pieces of software." □

Newton

From Page 1

Apple's software can use and yours can't."

Daryl Scott, executive vice president of Strategic Mapping Inc. in Santa Clara, Calif., said: "The tool kit lets you prototype applications on the Mac relatively quickly without having to be an expert developer. A lot of the underlying engine work you need to do in normal applications is already done."

Apple said it will release the tool kit before the first Newtons ship this summer and will seed developers with Newtons beginning next month. The Newton Toolkit initially runs on the Mac; a later version will let developers program on Windows machines as well. Sources said pricing should be just a few hundred dollars.

The Newton Toolkit also contains: NewtonScript programming tools for editing, compiling and debugging; graphical layout tools for user-interface construction; Newton Components, a set of reusable application objects; and content and authoring tools for adding navigation and intelligence to textual and graphical content.

Applications developed with the tool kit will run across the range of Newton devices planned by Apple and such partners as Siemens AG.

Apple will provide tools to help developers link existing desktop applications to Newton applications but declined to set availability. "Until Newtons can link up with desktop applications, they're pretty limited," one developer said.

Apple told developers that Newton will use its QuickDraw imaging model. For end users, this will mean that they will be able to print from a Newton to QuickDraw printers such as the Apple StyleWriter simply by attaching the device via its serial port.

James Joaquin, product line manager for Newton core software and tools, said Apple "hopes to foster innovation in the marketplace. We don't expect developers to port word processors and spreadsheets; we expect new kinds of applications focused for niche markets."

Developers agreed that vertical market applications would be a good target but wondered about broader sales potential. One developer said: "Is it sexy? Yes. Is it useful for in-house vertical stuff? Very. Is it a new horizontal platform? We're taking a wait-and-see attitude."

Developers also wondered if profit margins would be large enough. Developing for Newton "will be fine for the guy working out of a garage but not for larger developers," said another developer.

Others were more optimistic. "I feel like a kid right before Christmas," said Iggi Monahelis, team leader at Molecular Design Ltd. in San Leandro, Calif. "There's some real development opportunities there."

Apple's Joaquin said Newton applications will be distributed through traditional retail and mail-order channels, but he expects online distribution to be the biggest venue. Apple will also distribute and publish Newton applications.

Newton applications can be installed via the device's PCMCIA slot, run off a PCMCIA card or downloaded via the serial port. □

GeoPort

From Page 1

Services Digital Network) and PBX services.

A possible telephony implementation, for example, would be a Mac acting as a voice-mail answering machine. Incoming callers could instruct the Mac to retrieve voice mail and electronic mail. Taking advantage of Apple's new voice-synthesis software, callers could have the mail read to them over the phone.

Other possibilities would be a speakerphone with full-duplex cancellation implemented solely through a Mac or an inexpensive teleconferencing system created by integrating digital cameras and similar hardware with GeoPort and telephony on the Macintosh.

GeoPort-equipped Macs will likely have three serial ports: Printer, identical to current Printer ports; Ethernet, identical to the external Ethernet port on Quadras; and a GeoPort labeled Modem. New technology in future Macs will accelerate even the Printer and Ethernet ports.

Current serial ports are mini-DIN 8 connectors. Sources said GeoPort uses a mini-DIN 9 connector, which will accept and support older cables and devices.

Apple is enhancing and supplementing current communications and telephony APIs to support the wide array of possible communications hardware that developers could encounter while connected to GeoPort. Programmers will be able to add telephony to their applications without knowing how to communicate with ISDN or PBX, for example.

The APIs support DSP chips in the Cyclone and Tempest, as well as equivalent functionality in PowerPC Macs. The DSP chip will let Macs emulate a variety of hardware, including data modems and fax machines. In effect, this means future Macs will ship with a fax-data modem inside.

Apple has told developers that the DSP will be able to implement most current modem and fax standards. As future standards such as V.FAST emerge they should be easy to add to a Mac with a software upgrade.

Because many of GeoPort's capabilities are implemented in software, current Macs will be able to use some of the technology's features. Since existing Macs don't have DSP chips, they will be unable to send and receive faxes, for example, but they could use external interface boxes with cables that connect them to ISDN and PBX services. □

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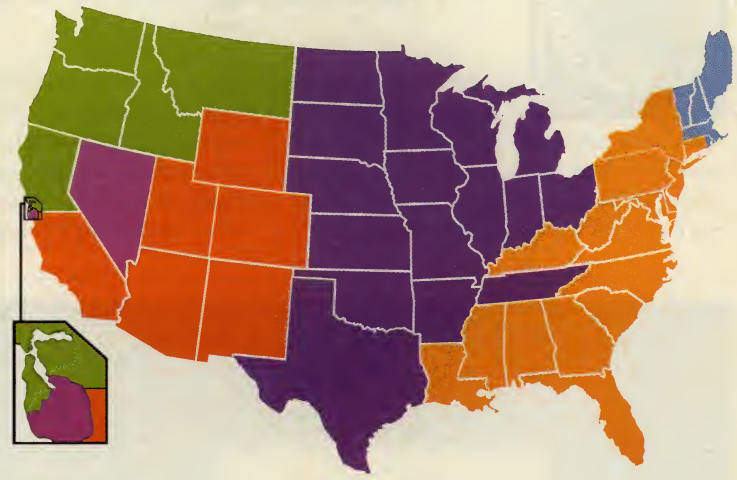

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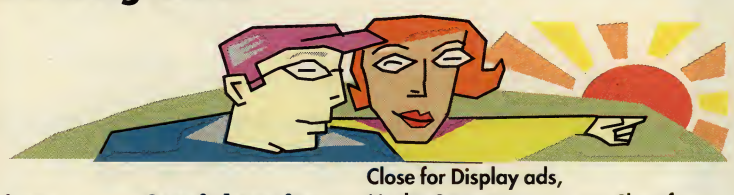

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Waiting for Mr. Right Tool

It's difficult to imagine a better way to mark the dawn of the post-Star Wars age than to get together with a couple thousand of your closest developer friends. And what better locale than San Jose? This was exactly the reasoning that drew the Knife and his entourage together last week. It will surely be recorded as one of the most serendipitous events of the year that this group assembled at the very time and place Apple was holding its annual developers conference. Imagine Apple's chagrin if the Knife had been mysteriously drawn to another point, say, a Caribbean resort, instead of the southern reaches of the San Francisco Bay.

Aside from the well-publicized announcements, there was a lot to be learned at this year's WWDC. Although the Knife was forced to part with his posse before the actual conference began, he was lurking about the perimeter area waiting for the sessions to end and the parties to begin. The Knife is inclined to avoid metaphysical observations, especially while on the road. He did note, however, that although the name Bill Gates was rarely mentioned in an official capacity, the specter of the company he heads hung over the proceedings like the memory of an affair gone sour.

What's up with the tools? Each evening as the parties shifted into high gear, the Knife went quietly about his business of trolling his admittedly well-toasted sources for their real opinions of the state of affairs. The consensus is that all the encouragement to take the cross-platform development plunge seems like a reasonable idea, except for the small issue of getting a hold of the right tools for the job.

Many developers are suitably anxious to develop for the PowerPC platform that Apple has promised, but the lack of native compilers has stymied all but those willing to spring for an IBM RS/6000. The complete Bedrock is still at least a year away, although developers will get prerelease versions later this year. Amber isn't expected until the end of the year. Even NewtonScript apparently won't be available until next month, just weeks before the Newtons themselves start shipping.

On the other hand, not all developer energy was expended on planning for the future. The people representing Claris Clear Choice made sure that everyone knew the division was on the make for products to acquire. They seemed willing to be NDAed on anything and everything. Normally some developers would have been leery of revealing trade secrets to a potential competitor, but most agreed that considering how long it took Claris to update MacWrite, there wasn't much risk in this case.

Picture this. Since the Sculley mansion has been on the market for some time now, the Knife decided it's time to show you a glimpse of what you can get for a mere $9.5 million. The list of amenities is beyond belief, but you might be interested in the sound studio that seats 18 and is equipped with its own "quaint powder room." Be warned, however, that unless you have a thing for busy prints, you should add the cost of several hundred square yards of new carpeting to the asking price. □

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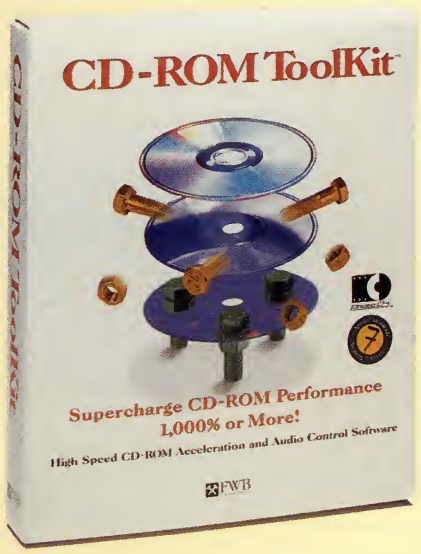

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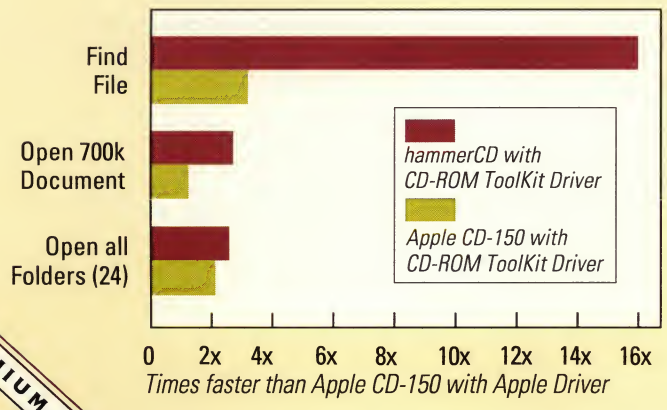

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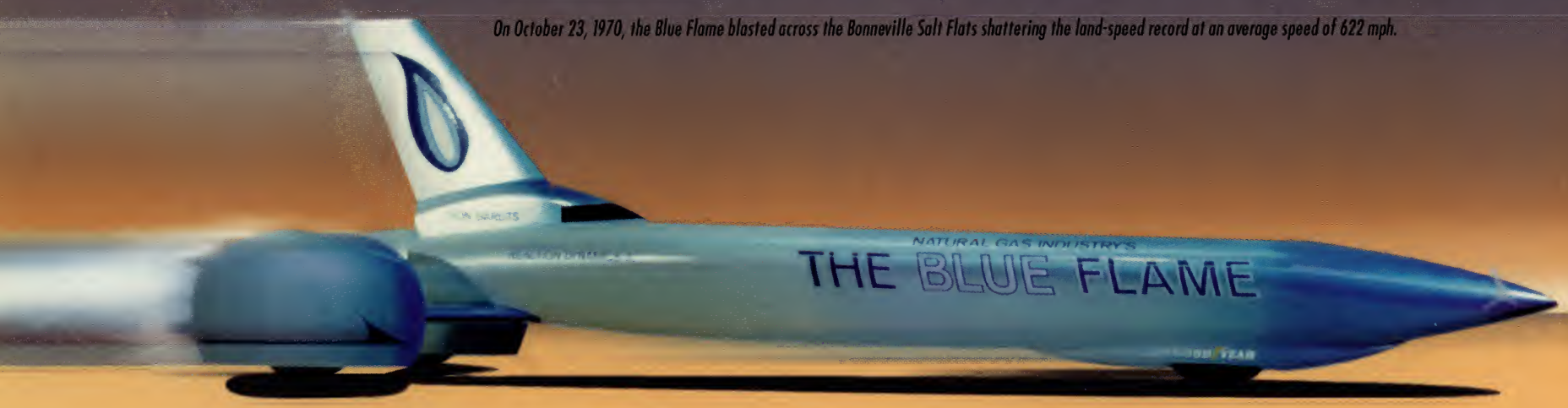

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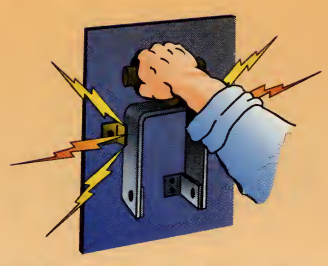

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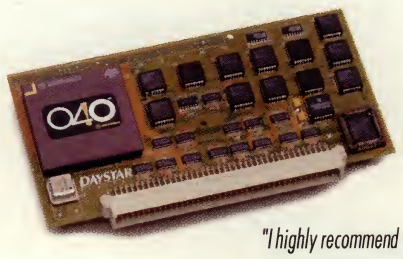

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